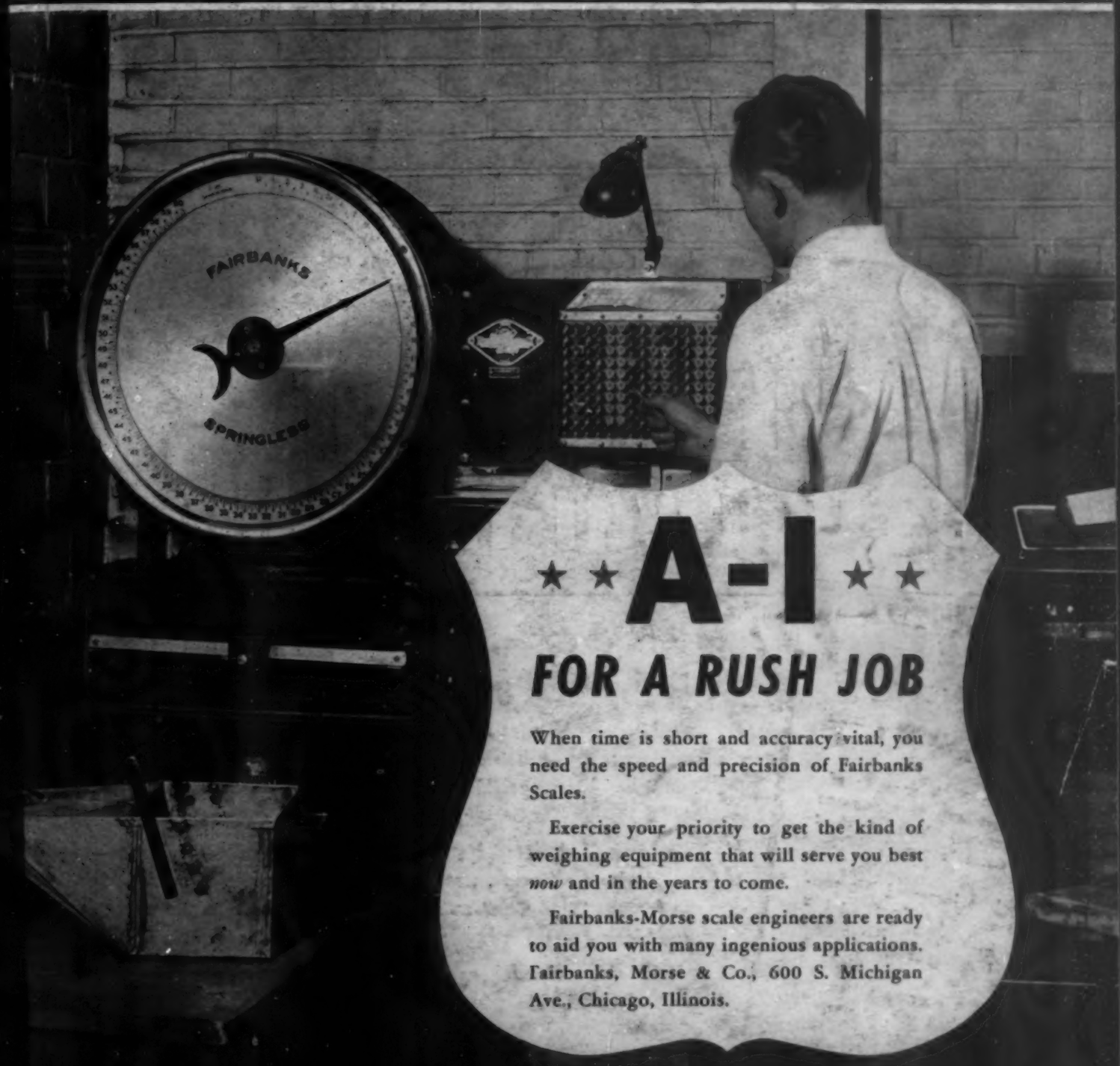
TECHNOLOGY DEPT.

July 6, 1942

STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

IN TWO SECTIONS ESTABLISHED 1882 SECTION ONE



★★A-1★★

FOR A RUSH JOB

When time is short and accuracy vital, you need the speed and precision of Fairbanks Scales.

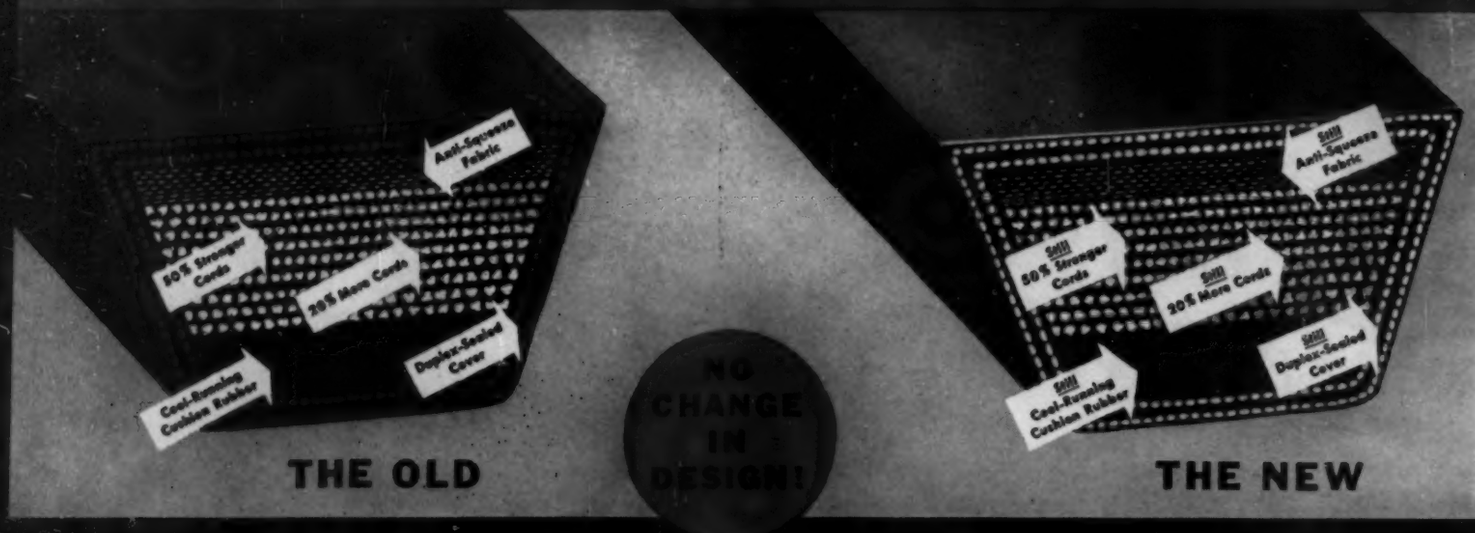
Exercise your priority to get the kind of weighing equipment that will serve you best *now* and in the years to come.

Fairbanks-Morse scale engineers are ready to aid you with many ingenious applications. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Illinois.

FAIRBANKS-MORSE

SCALES
DIESELS
MOTORS
PUMPS

More RED for the RED WHITE & BLUE



TEXROPE Goes to a war-time black!

YOU STILL GET . . .

1. The 50% stronger cords made possible by the sensational new Flexon process.
2. The 20% more cords that help give Texrope Super-7 V-Belts their extra "muscle".
3. The increased life provided by Texrope's shock-absorbing, cool-running rubber cushion.
4. The extra protection against grit, grease and dampness of the duplex-sealed cover. The *only* thing changed in cover design is the color!

NO ONE SAID we *had* to do it . . . but by sacrificing the red surface color identified with Texrope* Super-7 V-Belts, more rubber could be made available for Uncle Sam's new and special war-time needs.

So Allis-Chalmers did what *you* would have done . . . switched the famous "Red Belt" to a war-time black.

Will this color change affect you adversely? No. In each and every detail of quality-design, *Texrope V-Belts are unchanged!* They're still the same tough, smooth-working belts . . . that were literally *made to order* for today's new three-shift-a-day, round-the-clock operating schedules.

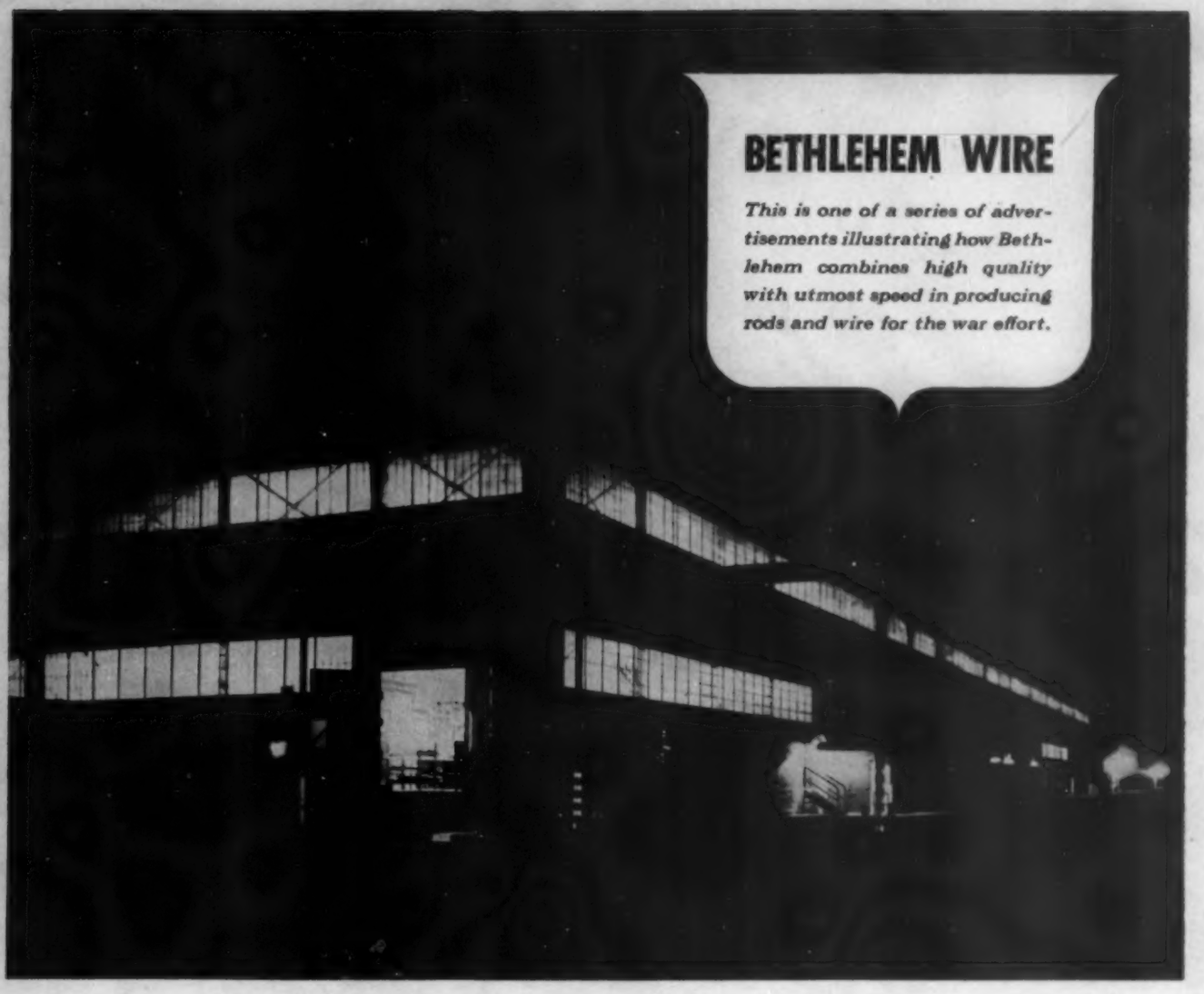
To step up the war-time efficiency of *your* power transmission, get the advice—and help—of your Texrope dealer or the Allis-Chalmers district office near you. Or write Allis-Chalmers, Milwaukee, Wisconsin. A-1517

*Trade mark registered U. S. Patent Office. Texrope Super-7 Belts are the result of the co-operative research and design genius of *two* great companies — Allis-Chalmers and B. F. Goodrich — and are sold exclusively by Allis-Chalmers.

Available in all sizes 1/2 hp to 2,000 hp

ALLIS-CHALMERS
MILWAUKEE-WISCONSIN

WE WORK FOR VICTORY WE PLAN FOR PEACE


BETHLEHEM WIRE
This is one of a series of advertisements illustrating how Bethlehem combines high quality with utmost speed in producing rods and wire for the war effort.

24 hours on rod-mill patrol

Production. That's Bethlehem's answer to the war demand. We get it in this giant Bethlehem rod mill by keeping on the move 24 hours a day.

We aren't satisfied with production alone.

It's not enough to produce a lot of rods. They've got to be as good rods as can be made without loss in efficiency.

So we keep a patrol of metallurgists on duty day and night. These men make a science of trouble-spotting. They ferret out seams, laps or imperfections in the billets. They double-check furnace temperatures, rolling temperatures . . . even check the temperatures of finished coils of rods as they come off the last mill stands. Cooled rods are then checked for size and critically examined and tested to reveal possible hidden weaknesses. The rod-mill patrol is a separate outfit. The men are on their toes. Their decisions are final.

Result: Bethlehem rods are as nearly perfect as modern science can make them. Bethlehem wire, made from those rods, is thoroughly dependable, will do a consistently good job.

BETHLEHEM STEEL COMPANY

RIGHT

ON THE NOSE!

Bomb-sights give American bombers the accuracy that enables them, in spite of speed, height and distance, to hit their targets "right on the nose".

What bomb-sights are to our fighting bombardiers, Micrometer Dials on Monarch Lathes are to the thousands of operators who are working furiously to build more and more planes for our Army, Navy and Marines. With these and other Monarch features, war workers save precious time and turn their jobs faster to the close tolerances required.

The rigidity and accuracy built into Monarch Lathes give them the stamina and dependability required for 'round-the-clock operation. They are helping our thousands of War plants to hit their Victory schedules—"right on the nose".

THE MONARCH MACHINE TOOL COMPANY • • • SIDNEY, OHIO

Proved accuracy of Micrometer Dials, large in diameter, with easy-to-read graduations in diameters instead of radii, save operator time. Standard on all sizes of Monarch Lathes—faster and more accurate production.

"Hogging work or finest finishing . . . we put our faith in Monarch Dials"

The Enterprise Tool & Mfg. Co., at Newark, N. J., produces jigs and fixtures as airplane subcontractors. They've used Monarch Lathes since 1929 — with new ones added in 1934, 1940, 1941 and 1942. One of these new Monarchs produces twice as much of the same work as the lathe it replaced. The extreme rigidity and accuracy of these lathes enable them to do the heaviest hogging work or the finest finishing cuts with unvarying precision. To use their own operators' words—"Monarchs hit it 'right on the nose'."

MONARCH LATHES

COVER THE TURNING FIELD

Behind the Scenes with STEEL

Don't Tie Up Your Mind

■ If you missed this article in the June issue of Reader's Digest we're sure you'll find it worth a couple of minutes:

I was a very young man selling advertising for a trade paper when a suspender manufacturer in a thumbnail New England town taught me a lesson.

He was the last prospect I had to call on before I came home from an unsuccessful trip, and my job might depend on getting an order from him. The night before, I worked out a definite plan of attack, deciding just how much space I would sell him and rehearsing my arguments till I was letter-perfect.

Next morning I recited so fluently that my customer never got a chance to speak until I laid my order blank on his desk. I had filled it out. Thirteen quarter pages. I handed him my fountain pen.

For a moment he looked at me, smiling.

"All right, son," he said and signed the order. I began to thank him, but he stopped me.

"I'm doing the thanking," he said. "You just saved me about $800. If you'd given me a chance to speak, I'd have told you half an hour ago that I'd decided to use 13 half pages."

I must have looked foolish enough to make him sorry for me.

"Now I'll give you something that you can thank me for. Advice. Do you want it?"

I'd have taken advice, right then, from a college sophomore. So I nodded.

"You wouldn't tie up your hands before a boxing match," he said, "but you thought it was clever to tie up your mind before an argument. It isn't clever, son. Keep on doing it and you'll run into worse surprises than this one."

Then he tore up the contract and had me make out one for the 13 half pages. That contract didn't save my job, but the lesson has saved me other things that mattered more.

The Lesson Worked

When I was applying for my next job, I had my mind tied down right to the exact salary my employer should pay me. But I remembered those 13 quarter pages, and let the boss tell me the higher figure he had tied his mind to. The lesson worked, and it has been working ever since.

Recently, before attending a board meeting, I reviewed all the things I was going to tell that mule-headed fellow director who was heading us straight for the red. But I let him talk first and he offered a better compromise than I had intended to suggest.

The other day I set out, iron-jawed, to tell those politicians in the assessor's office just how much they should cut my assessment and what I'd do if they didn't. On the way I remembered my suspender maker. Instead of the surly defiance I'd expected to meet, I found friendliness, and came away with a very reasonable revaluation.

My new water heater fell short the three simultaneous tubfuls it was guaranteed to furnish. My immediate reaction was to write a frothing letter to the contractor and demand a rebate on the price. But I merely asked him for a fair adjustment. It turned out that he thought I should have a larger heater and offered to install it free.

A young kinsman was bent on quitting college to make a foolish marriage, despite threats and browbeatings from his parents. I had more browbeatings ready for him, but just in time remembered to keep my mind untied. I didn't lecture. I listened. And the boy's militant defiance talked itself down into an admission that he was unhappy about his decision but had persisted because his pride wouldn't let him knuckle under to bullying.

Taking opposition for granted is a good way to make sure of meeting it. But if you follow the advice of my suspender-making guardian angel and keep your mind untied you'll be astounded how often people turn up on your side of a question.

Aptronyms

■ Names that fit the jobs: Chas. C. Steel, Industrial Salvage Consultant, WPB, and H. M. Messenger, Sales Promotion Mgr., American-LaFrance-Foamite Corp.

A God-Send

■ With this week's issue you'll find (or should if someone hasn't pilfered it already) STEEL's new and revised Priorities Guide. It contains all the orders on Allocations, Priorities and Prices, an explanation of the Production Requirements Plan, and a complete listing of the Allocation Classification System. Extra copies are available to regular subscribers free of charge up to a dozen, and 10c each over that.

Here, for example, is what J. J. Adams, General Manager, Hubbard & Co., Huntington, W. Va., has to say about this service:

We want to express our appreciation of the Priorities data printed in your publication. It has been a god-send to us as we would not have been able to keep up with priorities and amendments due to lack of information and delay in receiving copies from Washington. We feel this service through STEEL has been noteworthy and that you should be complimented for service rendered.

What the Army is Buying!

In the June 25th issue of the U. S. Government Advertiser we find that the Army Quartermaster Depot at Philadelphia recently awarded contracts for girdles, brassieres, slips and panties. It is only fair, however, to state that these articles will be used by the Women's Army Auxiliary Corp. The contracts were awarded under PC-WAAC No. 2.

Bulletin Board

■ At the Pfaudler Co. in Elyria, Ohio bulletins are distributed from a "Take One" box with this proclamation on it:

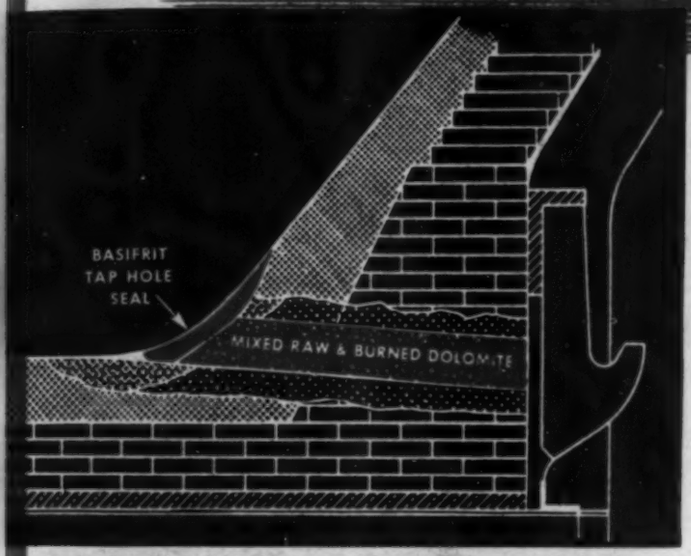
Take one ye men of Strange Concern
There's many things herein to see.

Interested you may not be,
But don't forget the darn thing's Free.

Vol. 111, No. 1, July 6, 1942, issue of STEEL, published every Monday at Cleveland, O. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Buy a War Bond—Today!

"What can you do for hard taps?" he asked the Basic Engineer



Application of Basifrit patch as tap hole seal. Dolomite mix is dug out of tap hole in usual way. Then Basifrit seal is broken easily with rod.

Basifrit is soaked thoroughly with water and then shoveled in quickly, just before the charge, to form a thin facing over the tap hole opening.

● "We're having plenty of trouble with hard taps. As a result, we're losing time and some of our alloy additions," complained a furnace superintendent to a Basic Refractories Field Engineer. What could he suggest?

This particular Basic Engineer is a veteran steel man. For more than 40 years he has lived with open hearths and electric furnaces. He immediately suggested a way to eliminate the hard taps.

Here is the method: First, the tap hole is filled as usual with mixed raw and burned dolomite. Then *just before the charge*, it is faced thinly with Basifrit, thoroughly soaked with water. This thin facing sets rapidly and safely seals the tap hole opening. The Basifrit seal is not gummy and does not take iron, It gives the second helper a feeling of safety when digging out. Yet it is not so heavy as to be difficult to break through with a rod.

This simple suggestion by a Basic engineer has ended many cases of trouble with hard taps, has cut down delay time and reduced alloy losses. It is typical of practical recommendations offered by Basic service men in their everyday work.

Think of Basic Field Engineers as *your* refractories service men. Their job is to help you get the best out of good refractories — to make those refractories contribute to greater production for war.

BASIC REFRACTORIES FOR THE STEEL INDUSTRY

MAGNEFER — Dead-burned dolomite for hearth and slag line maintenance.

SYNDOLAC — Dead-burned, rice size dolomite for maintenance.

BASIFRIT — Quick-setting magnesia refractory for new construction, resurfacing and maintenance.

OHIO MAGNESITE — Domestic dead-burned high-magnesia grain refractory, equal to Austrian.

695 PLASTIC — Strong plastic basic refractory for hot and cold repairs.

RAMEX — An air-setting, time-saving basic refractory for rammed hearths and cold repairs in open hearth and electric furnaces.

GUNMIX — A basic refractory for maintenance of furnace walls, sized for use with a cement gun.

HEARTH PATCH — For deep hole patching and other quick repairs in the basic open hearth.

RAW DOLOMITE — Washed open hearth dolomite in rice size and standard ¼-inch.

BASIC HEARTH

REFRACTORIES

BASIC REFRACTORIES INCORPORATED

FORMERLY BASIC DOLOMITE, INC.

CLEVELAND, OHIO

Firth-Sterling

ANNOUNCES

ANOTHER SUBSTANTIAL REDUCTION IN FIRTHITE TUNGSTEN-TITANIUM CARBIDE PRICES

THE established Firthite policy has been not only to improve the quality of its products but also to lower the cost to the ultimate user.

Here is the most recent example—a real step forward that is still further extending the use of sintered carbides for STEEL CUTTING.

QUALITY IMPROVED—After many years of research on the addition of Titanium to sintered carbides, we offer certain grades of Tungsten-Titanium Carbides that set new performance standards in the machining of steel.

PRICES LOWERED—The wider use of Firthite Tungsten-Titanium Carbides in the TA, T-04, and T-16 Grades has resulted in lower processing costs. TITANIUM, itself, costs less than other ingredients. It is abundantly available from domestic sources. The more of it we use, the less dependent we are on imports of scarce metallic ingredients from foreign countries.

NEW METHOD OF PRICING—Heretofore, in pricing sintered carbides, differences in manufacturing costs have not been recognized. In our new method of pricing, we take into account the foregoing economies—and pass them on to you. (We believe that we are the first in the industry to do this.)

TUNGSTEN-TITANIUM CARBIDE GRADES

PRICES ARE REDUCED ON:

GRADE T-04 — Closest approach to a universal grade. Especially recommended for heavy duty, interrupted cuts, coarse feeds, etc.

GRADE TA — General-purpose material for cutting steel—cast, rolled, and forged. Light, intermittent cuts.

GRADE T-16 — For light, rapid finishing of harder steels.

ABOVE PRICE CHANGES DO NOT APPLY ON:

GRADE T-89
GRADE T-90

These are Tantalum* - Titanium - Tungsten Carbide grades, and are sold for some steel-cutting applications.

*Tantalum is now on the "allocated" scarce materials list.

FOR LATEST PRICES, SEE THESE NEW BULLETINS:

Firth-Sterling
STEEL COMPANY

OFFICES: McKEESPORT, PA. NEW YORK HARTFORD LOS ANGELES CLEVELAND CHICAGO PHILADELPHIA DAYTON DETROIT

WANTED!
THE RETURN OF
HIGH-SPEED STEEL SCRAP
Believed in hiding in America's vital industrial plants. Description—aged, worn or broken down. To be returned and drafted "in the service." This notice addressed to all users and makers of high-speed steel tools interested in apprehending this slacker.
REWARD
The satisfaction of knowing you are doing your bit to relieve high-speed steel shortage

YOUR TOOL STEEL MAKER *needs your* HIGH SPEED STEEL SCRAP

★

- The growing scarcity of steel scrap must not be allowed to hamper America's war effort. The necessity for its prompt salvage is therefore self-evident! Especially is this true of high speed steel, since its high Vanadium content is of such vital importance.

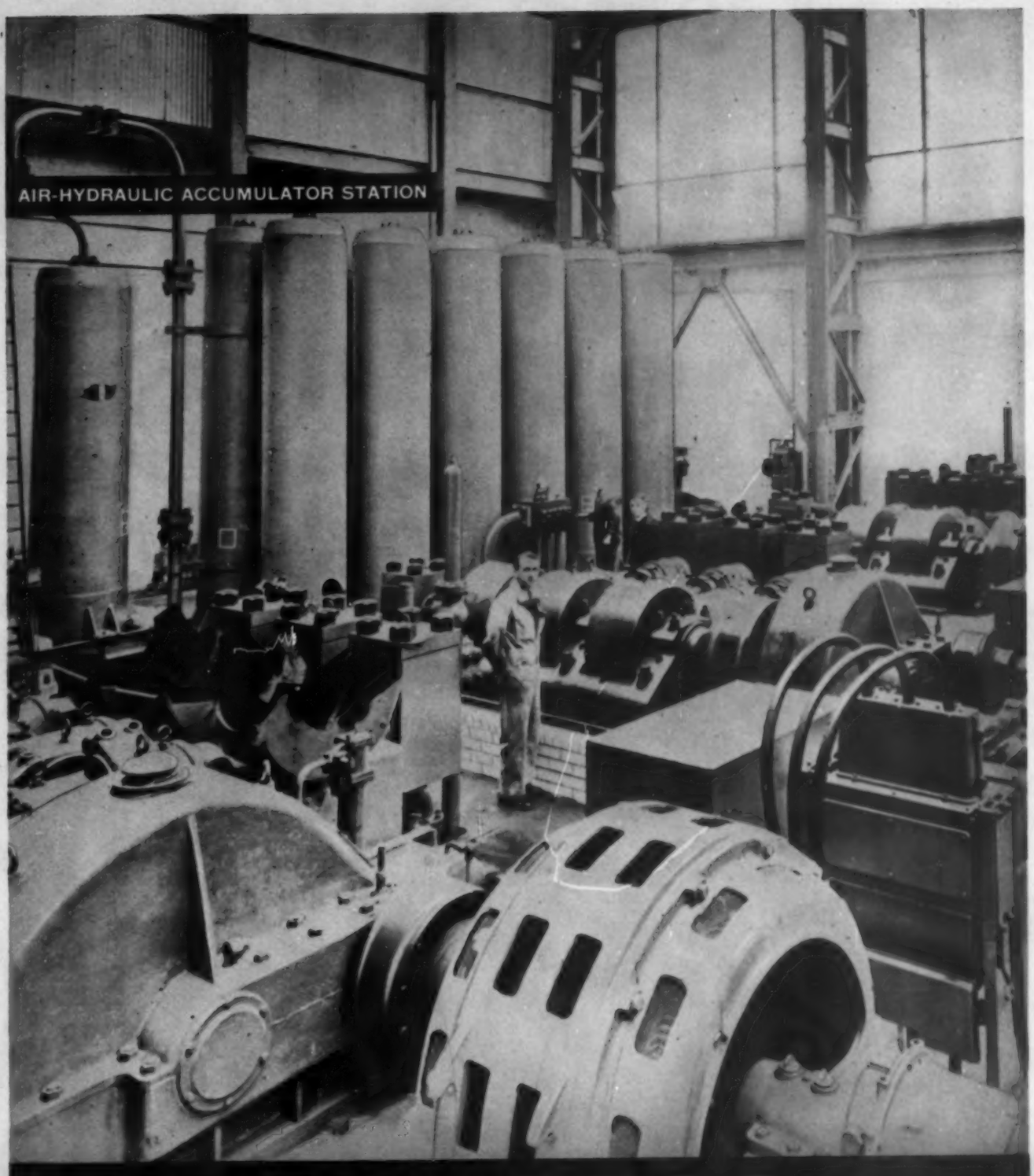
Latrobe is using this space to urge all tool steel users and manufacturers of tools to make every effort to return to your tool steel producer all such scrap. You will help yourself as well as our country by your prompt cooperation.

LATROBE

ELECTRIC STEEL COMPANY

LESCO

MAIN OFFICES *and* PLANT • LATROBE • PA•

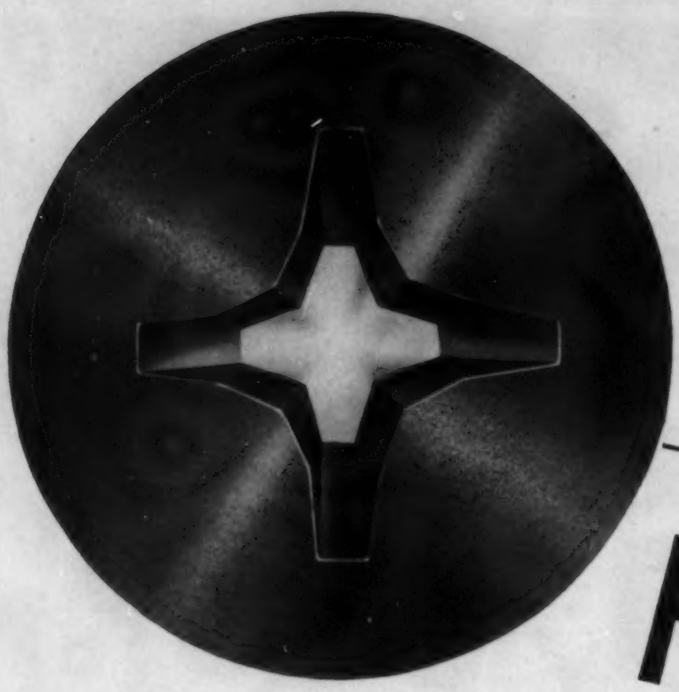


HYDROPRESS · INC.

ENGINEERS CONTRACTORS

HYDRAULIC PRESSES · ROLLING MILLS
PUMPS · ACCUMULATORS

570 LEXINGTON AVENUE · NEW YORK · N. Y.



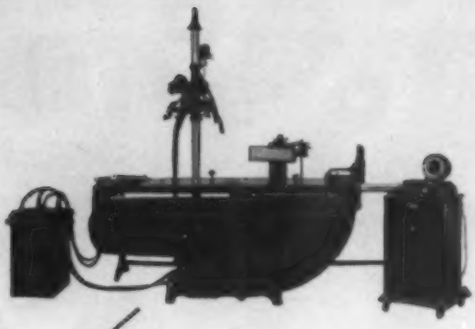
Formula...

for Efficient Fastening

As leading firms change from peacetime to wartime production, more and more of them standardize on this "formula" to get 3 PLUSSES with every order for Phillips Screws.

American Body & Equipment Co. — another customer for the modern fastening device, "American PLUS" Phillips Screws.

AMERICAN PRODUCED THE PLUS ...



American PLUS Phillips Screws are used in several types of x-ray tables by General Electric X-Ray Corporation.

Mall Tools are assembled with fast-driving, tight-seating American PLUS Phillips Screws.

American + Phillips =

PLUS 1 **Increased Production**

American Screw Company engineers, experienced through perfecting the Phillips Screw and introducing it to hundreds of assembly lines . . . are prepared to help you save as much as 50% in assembly time.

PLUS 2 **Complete Reliability**

American Screw Company technicians, working in our chemical and metallurgical laboratories, are using every means to assure the 100% reliability of raw materials and manufacturing methods.

PLUS 3 **Uniform High Quality**

An unexcelled method of piece inspection, developed by American Screw Company engineers, means that *every screw* is checked. Full count, full quality is assured in every shipment of American PLUS Phillips Screws.

This same formula . . .

now helping to speed the assembly lines of America — can be put to work *for you* today. Our engineers are available at a moment's call — our American PLUS Phillips Products are available through leading mill supply distributors and hardware jobbers.

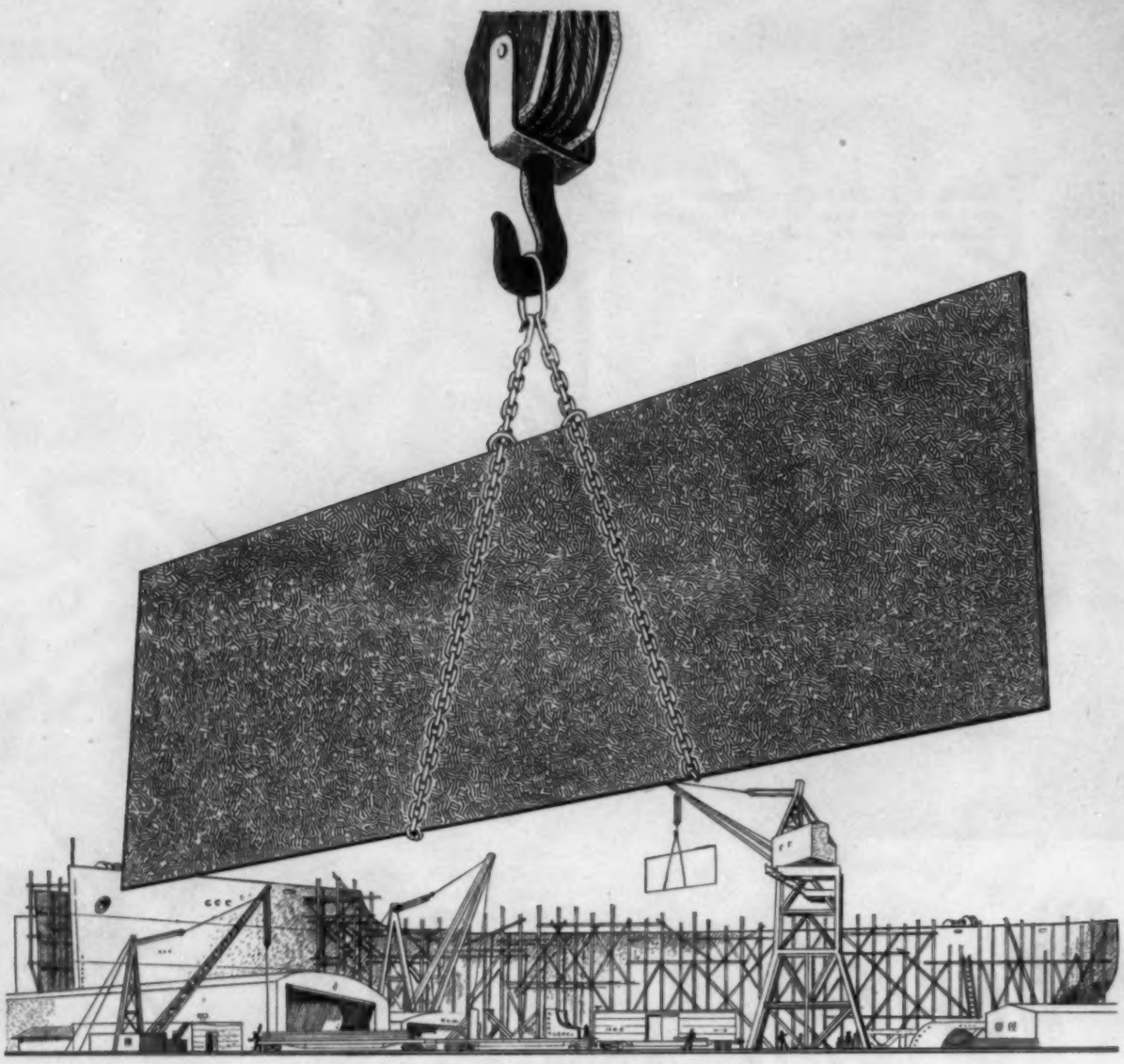
AMERICAN SCREW COMPANY

Providence, R. I.

Chicago, Ill. 589 E. Illinois St.

Detroit, Mich. 1847 W. Bethune St.

THE PLUS IS PRODUCING FOR AMERICA



HOT-DIP GALVANIZED AND

On the ways

IN SCHEDULE-PERFECT TIME

From mill to galvanizing kettle to shipyard ways! The process is going on daily as plates, shapes and fabricated materials pass through the Hanlon-Gregory Plant for galvanizing or pickling and painting in record-breaking volume. There is no delay: Materials are received, processed and shipped promptly on schedule, the same day if necessary. Hanlon-Gregory is speeding the production of ships. Expanded facilities have enabled us to handle the vastly increased volume of war production, with capacity to spare! If it's a defense job and in a hurry, ship your materials to Hanlon-Gregory, the world's largest hot-dip galvanizing plant.

HANLON-GREGORY GALVANIZING CO.

Pittsburgh *Pennsylvania*

THE WORLD'S LARGEST JOB GALVANIZING PLANT

"TYRES" *for the iron horse that was building our nation were the first thing made at Midvale*

Without the vision of the early railroaders this nation would never have spread from coast to coast—and those early locomotive "tyres" made its growth possible. Similarly, since then, the automobile, the oil and process industries have widened our land's mental horizons. And, again similarly, Midvale pioneering in steel and its alloys has made their growth possible. Just where steel will fit into the world of tomorrow nobody knows. From past experience we do know that Midvale's work of yesterday and of today will be tremendously useful in meeting tomorrow.

1867 75TH ANNIVERSARY 1942

THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA, PA.

OFFICES: New York • Chicago • Pittsburgh • Washington • Cleveland • San Francisco

MIDVALE

FOR FABRICATED METAL PARTS » » TURN TO

● Write for this brochure. It shows where Lyon facilities can be used to best advantage in accelerating war goods production.

LYON
WAR PRODUCTS STAFF

This staff—which meets daily—has more than a year's experience expediting War Contracts. Its record for getting results has won widespread press comments.

● Getting a contract for War materials is one thing. Organizing to deliver it when and as needed is quite another . . . particularly when competent sub-contractors must be located, their facilities investigated, and their bids analyzed.

For products or parts of products fabricated from metal, turn to Lyon Metal Products, Incorporated, to get quick, positive cooperation, and "on time" deliveries. Our War Products Staff—representing all major departments—meets daily to expedite war contracts. This staff—widely experienced in handling special war products—provides a practical knowledge that saves time and eliminates false steps.

Back of Lyon's War Products Staff is one of America's largest and best equipped metal fabricating organizations. Lyon's modern plants cover an area of over half a million square feet. Each department is fully equipped for fast, precision handling of its particular job . . . utilizes the latest production machines, tools, and methods developed by our own engineers. Completely equipped tool rooms assure prompt production and maintenance of all necessary dies and jigs.

So, if your War Contract requires fabrication of No. 8 to No. 30 gauge metal—*come to Lyon for action!* Comprehensive brochure, "Craftsmen in War Production" describes Lyon facilities in detail. A copy is yours for the asking.

LYON METAL PRODUCTS, INCORPORATED

General Offices: 7207 Madison Avenue, Aurora, Illinois

Sales and District Offices Manned by Experienced Engineers in All Principal Cities

LYON METAL PRODUCTS, INCORPORATED

The Long Range Point of View

In common with all other Industrial concerns, we at The Cleveland Punch and Shear Works Company are keeping the wheels turning day and night to fill our orders and meet promised delivery dates.

But we, too, are thinking about tomorrow, and, even in the stress of the present emergency, are determined to maintain that quality inherent in all Cleveland Presses, to the end that machines built to meet present day requirements will continue to serve industry efficiently in the post war period, when that time comes.

This is the long range point of view which has for the past sixty years, been synonymous with the name CLEVELAND.

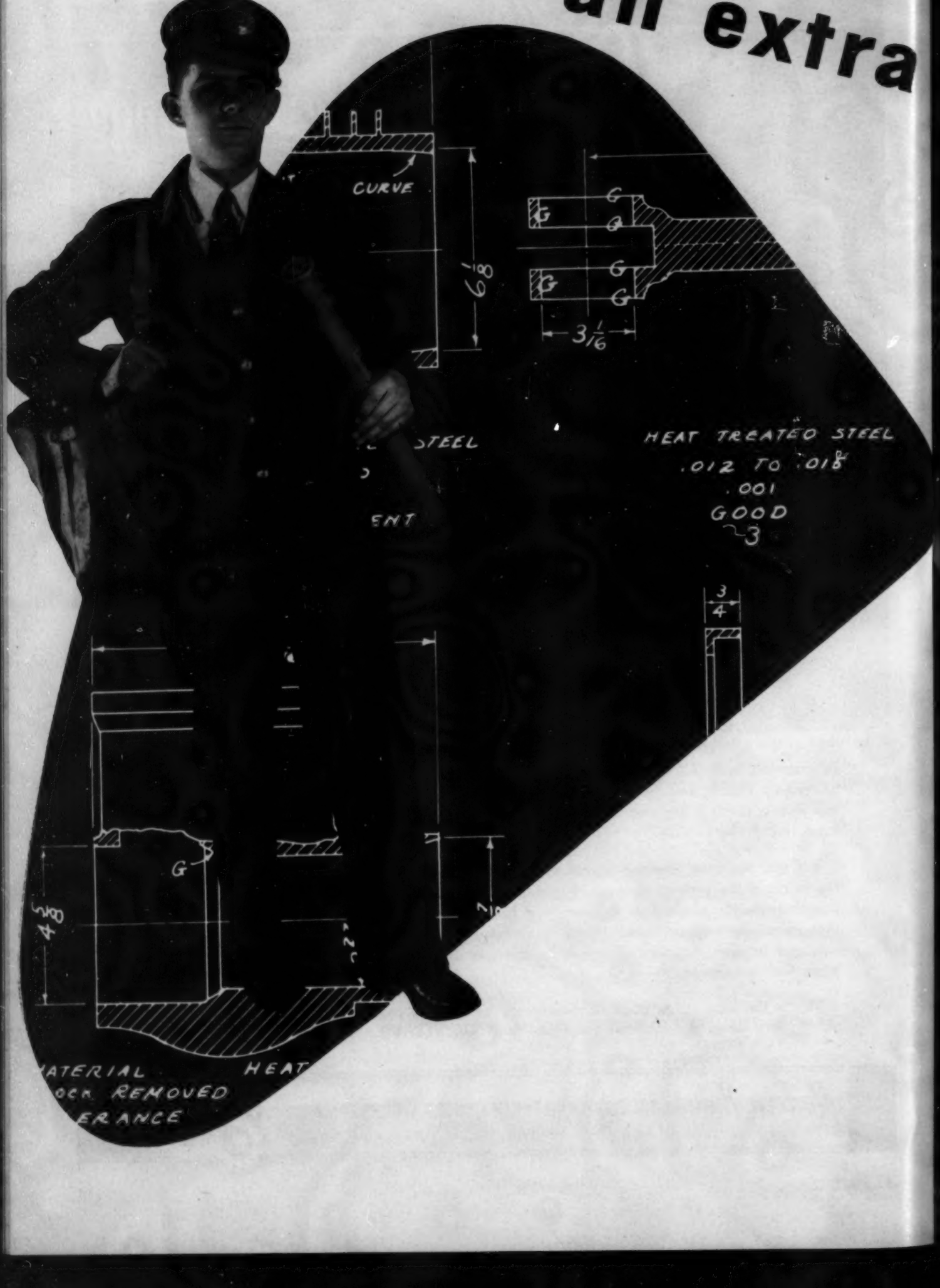
The large illustration shows a Modern Cleveland 4 Point Press having a capacity of 750 tons, stroke 30", adjustment 6", Bed area 80" x 144", shut height 60" and operates at 14 strokes per minute.

The smaller illustration shows a Modern Cleveland 4 Point Press having a capacity of 750 tons, stroke 30", adjustment 6", Bed area 80" x 120", shut height 60" and operates at 14 strokes per minute.

Modern Presses THE CLEVELAND PUNCH & SHEAR WORKS COMPANY *Cleveland, Ohio*

NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • PITTSBURGH

an extra


CURVE
6 1/8
3 1/16
G
STEEL
HEAT TREATED STEEL
.012 TO .018
.001
GOOD
3
3/4
4 5/8
MATERIAL
HEAT
REMOVED

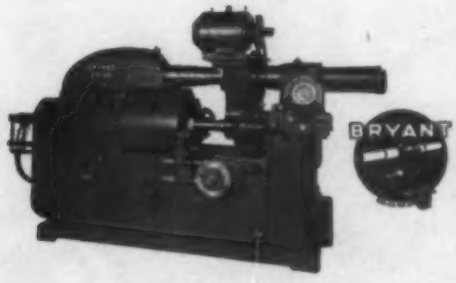
nt for Bryant

On every new job with internal dimensions to grind, it pays to make an extra blueprint, and it pays to send that extra blueprint to Bryant. By studying blueprints or sketches of new work in early stages of development, Bryant engineers can often help you in unexpected ways — to combine operations, cut costs, insure accuracy and save time.

With capacity tripled and constantly increasing, Bryant is not only geared for all out defense, but organized to speed the preparation of new products for post-war markets. That's why far-sighted manufacturers find that it pays to "send an extra blueprint to Bryant."

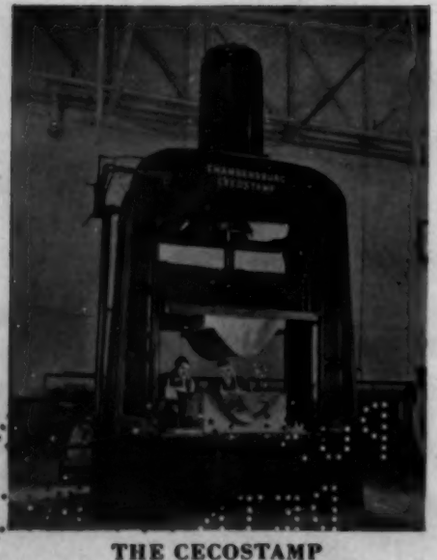
BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.



Cecostampings

WINDOW and DOOR FRAME. At right are shown two sides of the half of a combination window and door frame for a bomber. These pieces are approximately 48" long, made of light gauge Alcoa SO-24, and are excellent examples of very light draws, without the use of rubber. These particular pieces were made on a 66" x 36" CECOSTAMP, the blanks having previously been cut to approximate shape. Handwork was necessary at the corners at the inside of the cutout to eliminate draw cracks in forming this light gauge material.



THE CECOSTAMP

The modern drop stamp for difficult forming of high strength steel and aluminum alloy sheet metal parts.

The Cecostamp is a high production, impact type stamping machine, designed and manufactured by the Chambersburg Engineering Co., for forming high strength sheet metal parts, such as stainless steel and many aluminum alloys. These difficult types of metals are formed with fewer operations and greater true-to-die accuracy, while permitting the operator to control the metal flow of the stamping, thus producing shapes without drawing and the reduction of sectional areas. With a Cecostamp you produce controlled stampings, overcoming the resiliency of hard-to-form metals and giving them a permanent set, at greater rates of production than heretofore possible.

Write for a copy of "Cecostampings," a new publication, just off the press, which contains examples of Cecostampings and details of their production.

CHAMBERSBURG ENGINEERING CO., Chambersburg, Pa.

CHAMBERSBURG

★ CECOSTAMP ★

HAMMERS PRESSES

For the Ladies (BLESS 'EM!)

25 YEARS OF STANDARDIZING ON COLONIAL 14

FOR A VERY PARTICULAR DIE APPLICATION!

• For a quarter-century this customer has specified COLONIAL 14 for his fine hand-mirror dies in preference to any other carbon steel—because Colonial's uniform structure, hardness, and freedom from distortion do a completely dependable job!

TOPS IN TOOL STEELS

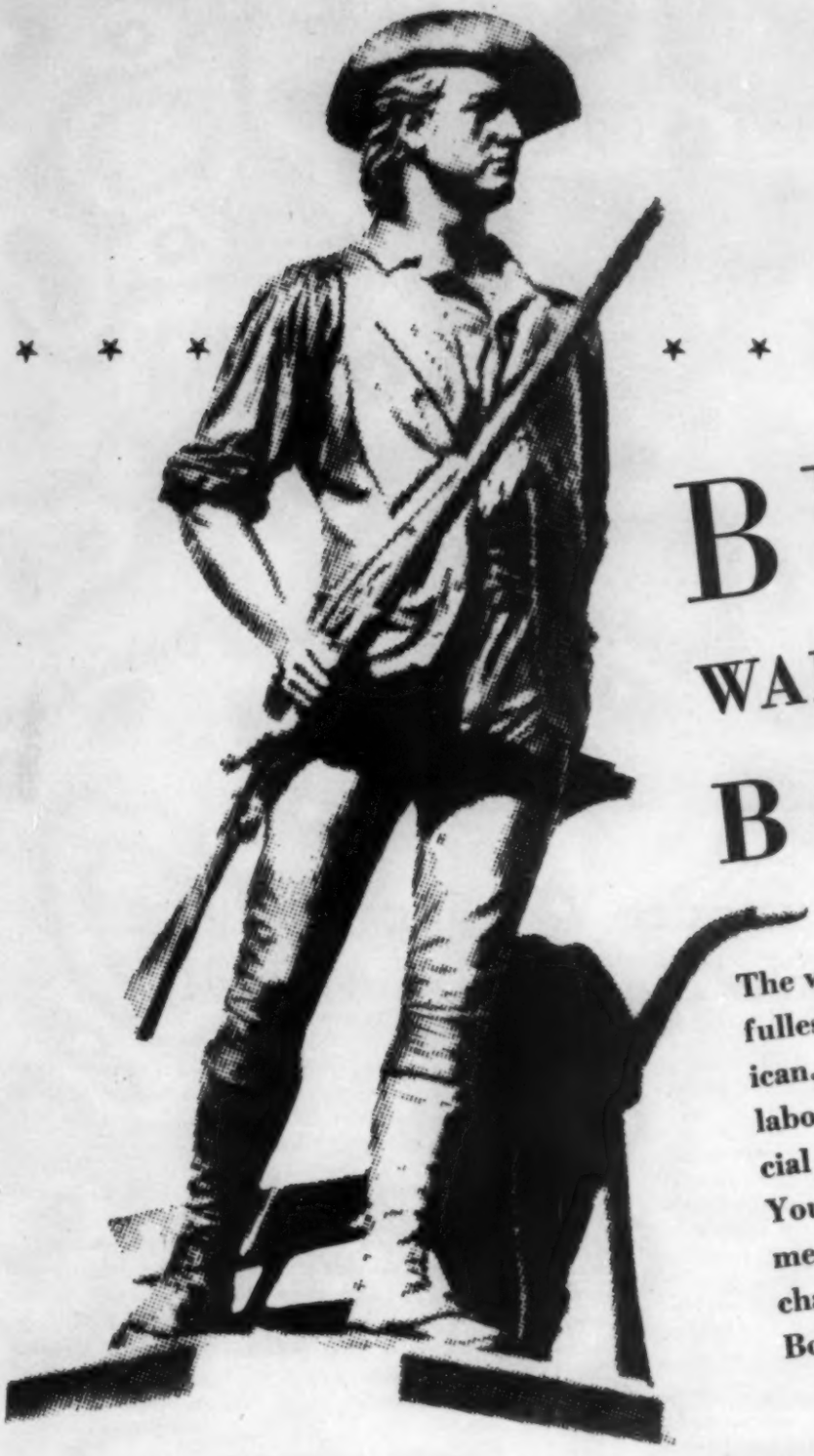
Vanadium-Alloys STEEL CO. LATROBE, PA.

INTO THESE COILS . . .
are blended the care of our metallurgists and chemists, the planning of our production men, the sweat of our many skilled workers . . . all working together for just one thing . . . to make sure that when our product becomes part of your product, it will give you exceptional performance.

WASHBURN WIRE COMPANY, NEW YORK CITY

WASHBURN

CLEAN, UNIFORM BILLETS–STRIP–RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES



BUY WAR SAVINGS BONDS

The war effort is worthy of the fullest support of every American. However, long hours of labor are not enough . . . financial support, too, is needed. You will help your Government and yourself if you purchase War Savings Stamps and Bonds on a *regular schedule.*

The nation's immediate needs for hydraulic presses and equipment still engage practically all of our efforts and facilities. However, R. D. Wood engineers will continue to cooperate to the fullest possible extent in the solution of your particular hydraulic press problems.

ESTABLISHED 1803

R.D. Wood Co.

PHILADELPHIA, PA.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE

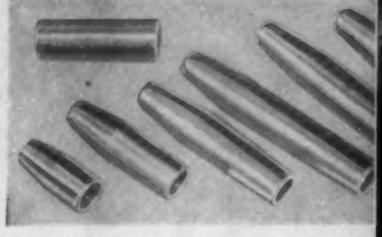
MALLORY STANDARDIZED WELDING ELECTRODES

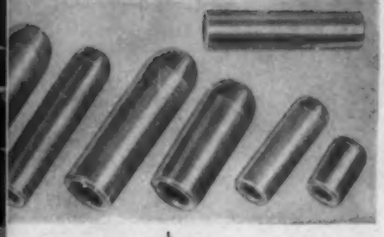
SPEEDIER PRODUCTION

BETTER WELDING

LESS DOWN TIME

LOWER COST





Resistance Welding Speeds Smoke Stacks for the Navy!

Resistance welding . . . already used on a large scale in building naval aircraft . . . has also speeded up the fabrication of light gauge warship assemblies for the U.S. Navy.

For instance, at the Philadelphia Navy Yard, smoke stacks for naval ships are now fabricated more rapidly and economically by spot and seam welding than by the previous method of riveting. Smoke stacks of cylindrical or elliptical shape, 25-40 ft. high and 8-14 ft. in diameter, are speedily assembled from galvanized steel or stainless steel sheets, 0.032-0.096 in. thick, stiffened by flat bars, angles or channels welded circumferentially or longitudinally to the stack interiors.

Pedestal type press welders, portable guns for inaccessible spots both ashore and aboard ship, and a seam welder comprise the Philadelphia Navy Yard's resistance welding equipment. Spot welding tips and holders, as well as seam welding rolls, represent Mallory's contribution to the increased speed and economy of this particular naval assembly job.

Mallory Standardized Resistance Welding Electrodes are used for important wartime applications because welding engineers have learned to depend on Mallory for resistance welding electrodes that produce more welds between redressings . . . assure a higher total of welds before replacement is necessary . . . and provide stronger, cleaner welds at lower cost.

Mallory's reputation among military and industrial welding engineers, foremen and welders rests on the solid foundation of long-continued Mallory research . . . that has developed special alloys, electrode designs and cooling methods . . . and that has culminated in our unique standardization program. Because of Mallory standardization, you can get the resistance welding electrodes and holders you need *promptly*, when and where you need them.

MALLORY Resistance Welding Data Book

Be sure your engineering files include this factual, complete treatise on resistance welding practices, alloys and specifications. Write for your free copy today.

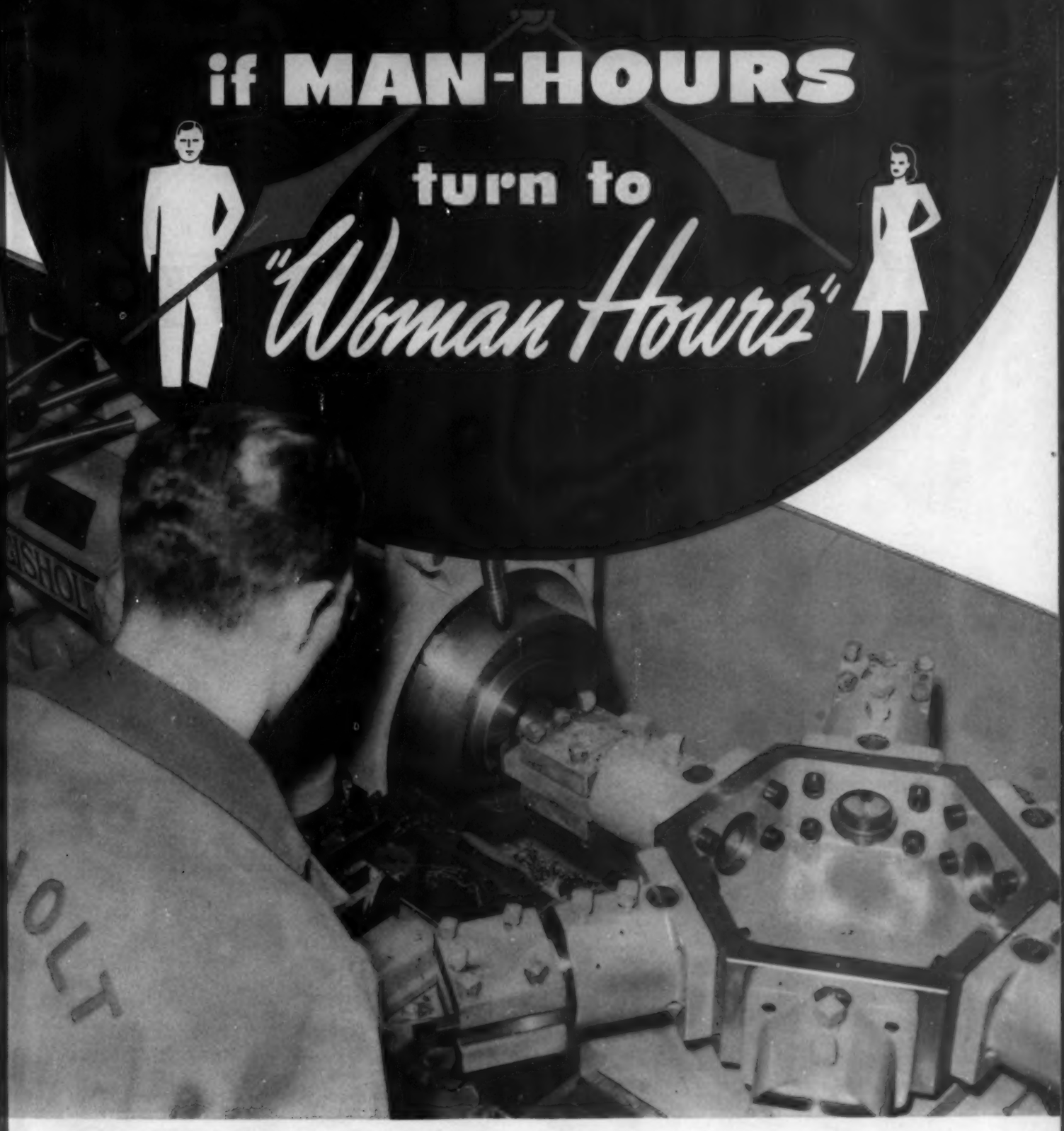
P. R. MALLORY & CO., Inc., INDIANAPOLIS, INDIANA • Cable Address—PELMALLO

RESISTANCE WELDING

P. R. MALLORY & CO. Inc.
MALLORY

STANDARDIZED ELECTRODES

if MAN-HOURS turn to "Woman Hours"



Teaching women the war-time jobs of relieving men at machine tools may come sooner than we think.

When it does, we can be grateful to our engineers and designers for the constant improvements which have led to simpler, easier operation, and have lessened the demands for physical strength.

GISHOLT MACHINE COMPANY

1217 East Washington Avenue • Madison, Wisconsin

LOOK AHEAD . . . KEEP AHEAD . . . WITH GISHOLT IMPROVEMENTS IN METAL TURNING

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

Whitcomb LOCOMOTIVES

FOR ALL SERVICES . . . .

Here is the latest addition to the Whitcomb line. An 80-ton Diesel electric equipped with two 325-HP. Diesel engines. Powered for snappy acceleration in spotting and switching cars, it can handle more work at a faster pace. Today, management is vitally concerned with the problem of moving materials in a hurry and Whitcomb has the answer in this rugged performer.

Whitcomb locomotives are assisting in the production of urgently needed raw materials and manufactured products. They are working long hours at very low operating and maintenance costs, earning the praise of owners. You can be assured of dependable and economical haulage if you place Whitcomb locomotives in charge of moving materials.

BLW THE BALDWIN GROUP

THE WHITCOMB LOCOMOTIVE CO.

ROCHELLE, ILL.

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

MORE PARTS PER TON

Getting the most out of each vital ton of steel is certain with CMP Strip. The CMP custom of rolling to exceptionally close tolerances, whether specified or not, assures maximum feet per pound and thus more finished parts per ton. It's a CMP advantageous "extra" you can always count on.

CUTS DOWN REJECTS

CMP production methods and controls result in consistent accuracy and uniformity. Duplication of all the desired properties in coil after coil assures steel fitted to the job —steel that means "top" fabrication efficiency.

FEWER MACHINE DELAYS

High speed production from automatic machines for long periods without interruption is possible with CMP Strip on the reel. Supplied in coils weighing up to 300 lbs. per inch of width gives length that keeps presses productive.

Right now is a good time to check on CMP Strip. Your war production might benefit from the inherent qualities always available from this precision cold rolled steel. Many manufacturers are experienced with the better and faster production and cost reducing advantages of CMP strip. It's worth an investigation now for your "all-out" efforts and well worth knowing about for postwar planning.

CMP PRECISION COLD ROLLED STRIP STEEL

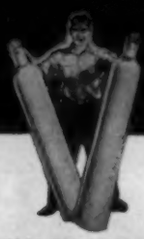
THE COLD METAL PRODUCTS COMPANY
Subsidiary of
The Cold Metal Process Company
YOUNGSTOWN, OHIO

CMP COOPERATION ALWAYS AVAILABLE

A letter, wire or phone call to Youngstown 4-2161 will bring you any assistance the CMP personnel can give on cold rolled strip steel problems. The vast experience of experienced people must meet your need.

PUT *OUT* THE TORCH WHEN IT'S *NOT* IN USE

Thoughtless waste takes a terrific toll. Lingering over a blue print while the torches burn . . . using the wrong pressure . . . or the wrong size tip for the job! Sure — it's only a few cubic feet now and then — but multiply it by the tens of thousands of torches burning to help win this war and it's easy to see why gas must be conserved . . . No waste can be tolerated and we must all make each cylinder work 24 hours every day. Make yourself a Waste Warden. Enlist your fellow workers so that we can all cooperate for victory.



THE WASTE WARDEN *says:*

DO close cylinder valve after use.
DO check your hose and connections for leaks.
DO keep your cylinder inventory low and return empties promptly.
DO keep tips clean and free from carbon and slag.

★ ★ ★

DON'T use excessive pressure.
DON'T use oversize tip.
DON'T leave torch burning when not in use.
DON'T abuse cylinders.

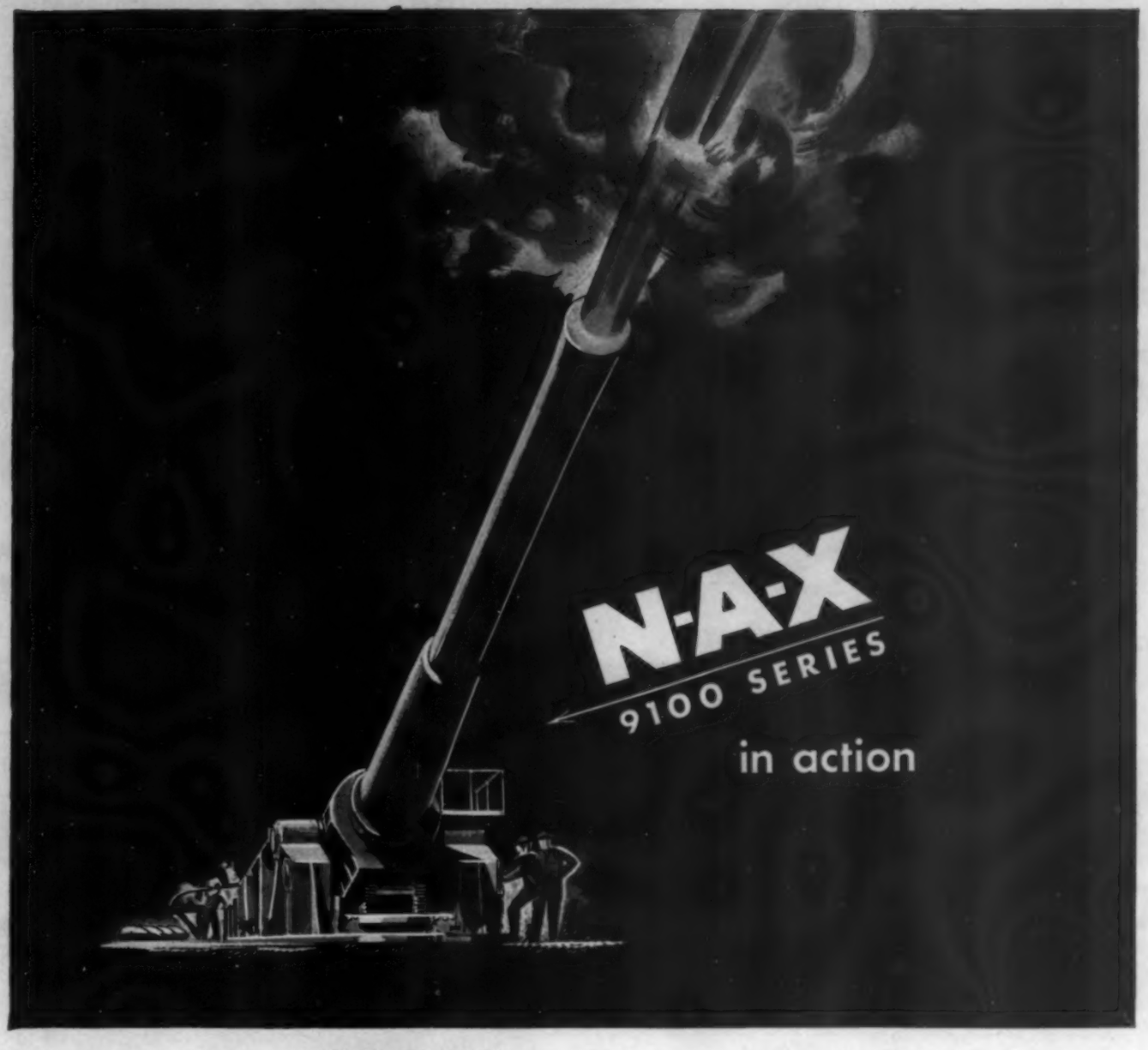
Air Reduction

General Offices:
60 EAST 42nd STREET, NEW YORK, N. Y.
IN TEXAS
MAGNOLIA-AIRCO GAS PRODUCTS CO.

AIRCO

WILSON

IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!*



N-A-X 9100 SERIES

Has Gone All-Out for VICTORY

Because of its unusual properties, this *VERSATILE STEEL* has found increasing use in the production of vital war equipment for our armed forces.

Tanks, bombs, gun carriages, trucks, transportation equipment of all kinds—in these and scores of other exacting applications, N-A-X 9100 Series is daily proving its superior qualities.

N-A-X 9100 Series, a carefully balanced alloy steel, contains *A LOW PERCENTAGE OF CRITICAL OR STRATEGIC ELEMENTS.* By its use conservation of such elements can be effected without impairing quality.

GREAT LAKES STEEL CORPORATION

DETROIT, MICHIGAN

Sales Offices in Principal Cities

division of

NATIONAL STEEL CORPORATION

Executive Offices: Pittsburgh, Pa.

OVERCOME THE SHORTAGE OF TIN BASE BABBITTS . . .

up to 100 times LONGER BEARING WEAR

with Westinghouse MICARTA Roll Neck Bearings

Even before the WPB Order M-43-A cut the tin content of tin base babbitt to 12 per cent or less, Westinghouse Micarta outperformed ordinary bearings by as much as 100 to 1. Mill after mill has reported that Micarta stays on the job longer, rolls more tonnage with fewer shutdowns for replacements.

Micarta is the unusual bearing material developed by Westinghouse which combines resistance to pressure or pounding with an extremely low coefficient of friction. Its smooth, tough surface is self-polishing . . . and water-lubricated. Grease costs are eliminated. And Micarta's lower coefficient of friction is quickly reflected in substantial power savings. Runs with Micarta Roll Neck Bearings average about 200,000 tons!

On the basis of extensive experience in rolling mill applications, Westinghouse has engineered three grades of Micarta:

GRADE 271 (mineral-filled, fabric base)—A long-life bearing for high-speed, high-pressure work such as finishing stands.

GRADE 295 (graphite-filled, fabric base)—Designed for slow-speed applications such as roughing stands, blooming, slabbing and structural mills.

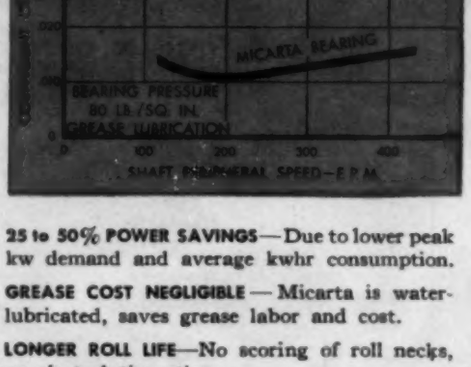
GRADE 280 (heavy fabric base)—A bearing for broad scope of general applications.

Ask your Westinghouse Representative to show you some of the production records set by other mills using Westinghouse Micarta. Or write today to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.

J-06331

5 ways better . . . and available now!

1. **LOWER COEFFICIENT OF FRICTION**—The chart below shows comparison of Micarta with *pre-war* babbitt (85% tin).



2. **25 to 50% POWER SAVINGS**—Due to lower peak kw demand and average kwhr consumption.
3. **GREASE COST NEGLIGIBLE**—Micarta is water-lubricated, saves grease labor and cost.
4. **LONGER ROLL LIFE**—No scoring of roll necks, no electrolytic action.
5. **CLOSER TOLERANCES OBTAINABLE**—Holds gauge accurately, requires fewer screw-down adjustments.

Westinghouse

MICARTA

Cumbersome Materials Moved Quickly and Safely

An overhead crane (see photo at left) for handling materials in one section of a shop, or a Tramrail System (see photo above) for direct transportation to all points in a plant, simplifies the hard job of moving heavy, awkward materials. Work that strains the backs of two or three men can usually be handled with ease by one man in a fraction of the time.

GET THIS BOOK!

OKLET No. 2008 . . Packed with valuable ormation. Profusely illustrated. Write free copy on your company letterhead.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1125 EAST 283rd ST. WICKLIFFE, OHIO.

MANUFACTURERS OF • CLEVELAND CRANES • CLEVELAND TRAMRAIL • STEELWELD BENDING PRESSES

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

1. WITH DEFENSE INDUSTRIES ON THE OFFENSIVE, plant equipment shoulders the responsibility to take punishment and keep going. Lead lined tanks, for example, must not only fight off the corrosive attack of industrial acids but also come out on top of their *mechanical* enemies—the stresses that cause buckling, creeping, cracking and failure. In such tough spots, Tellurium Lead has shown important advantages . . .

2. IT STRENGTHENS UNDER STRESS. Yes, Tellurium Lead actually "work-hardens." Sure it's tough to start with. But hammer it . . . roll it . . . bend it . . . stretch it . . . and it gets *tougher!* That means extra resistance to cracking at turnover points and joints, to vibration, to fracture from repeated temperature changes, and to buckling and creeping . . .

Industrial Tanks have to Win Battles, Too!

3. BUT THAT'S NOT ALL. Tellurium Lead has extra "acid-fight," too . . . keeps sulphuric and other sharp-clawed acids under control. A high temperature lead, it resists their corrosive attack even at temperatures approaching its melting point. Result: In many installations, it has meant longer life and fewer shutdowns for tanks, coils and pipe lines . . .

4. NO WONDER MUNITIONS FACTORIES, metal plants, oil refineries and textile mills rely on Tellurium Lead equipment to help prevent "time-out" in vital acid processes. This new alloy combines the well-known properties of St. Joe chemical lead with the new advantages gained from Tellurium. Fabricated in sheets, pipes and coils, it is helping industry go over the top in the war production drive.

NATIONAL LEAD COMPANY—New York, Baltimore, Buffalo, Chicago, Cleveland, Cincinnati, St. Louis; National-Boston Lead Co., Boston; John T. Lewis & Bros. Co., Philadelphia; National Lead & Oil Co. of Penna., Pittsburgh; Georgia Lead Works, Atlanta; American Lead Corp., Indianapolis; Master Metals, Inc., Cleveland; The Canada Metal Co., Ltd., Toronto, Montreal, Winnipeg, Vancouver.

TELLURIUM LEAD

• A NATIONAL LEAD COMPANY PRODUCT •

WINNING TWO WARS AT ONCE!

• American aerial bombs are bursting on a score of Freedom's battlefields. And hot off the presses are coming more and more shells, cartridge cases and parts for planes, tanks, guns and ships.

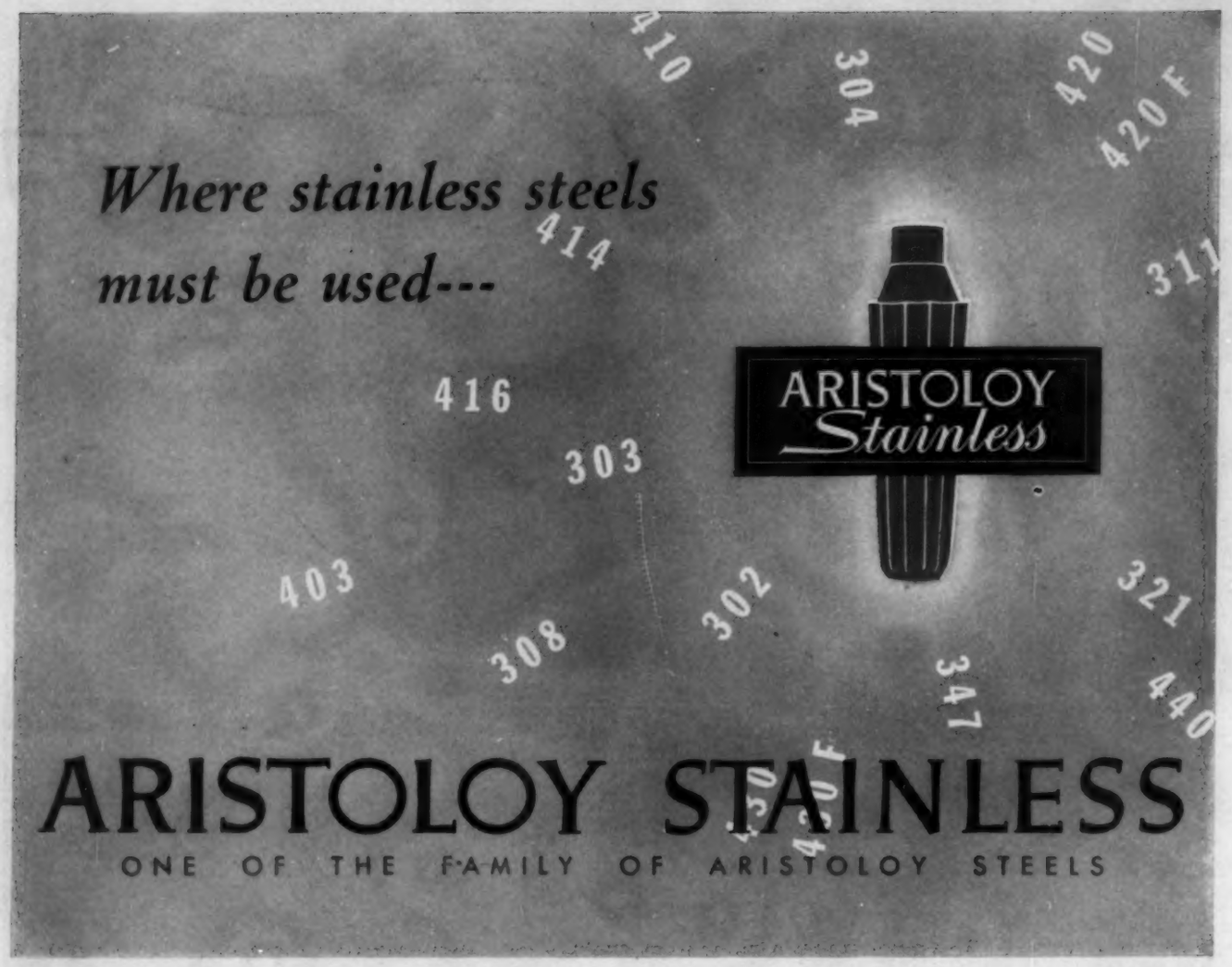
• Tough veteran fighters on the production line are Elmes hydraulic presses . . . performing all kinds of forging, forming and pressing operations with speed and accuracy. That's the Elmes' role in the war on tyranny. But there's another war . . . the ceaseless war on Production Costs. Here, too, Elmes Hydraulic Presses, Accumulators, Pumps and other products have a grand record for low-cost performance. Built into every Elmes product is an unquenchable belief in quality and 91 years of practical *knowing how* to produce it.

• Any time is a good time to discuss production problems with Elmes engineers. Now, for instance.

CHARLES F. ELMES ENGINEERING WORKS
243 No. Morgan St. • Chicago, Illinois
Also Manufactured in Canada
WILLIAMS & WILSON, LTD., *Distributors*

Since 1851
Elmes

METAL WORKING PRESSES • PLASTIC MOLDING PRESSES • PUMPS
EXTRUSION PRESSES • ACCUMULATORS • VALVES • ACCESSORIES

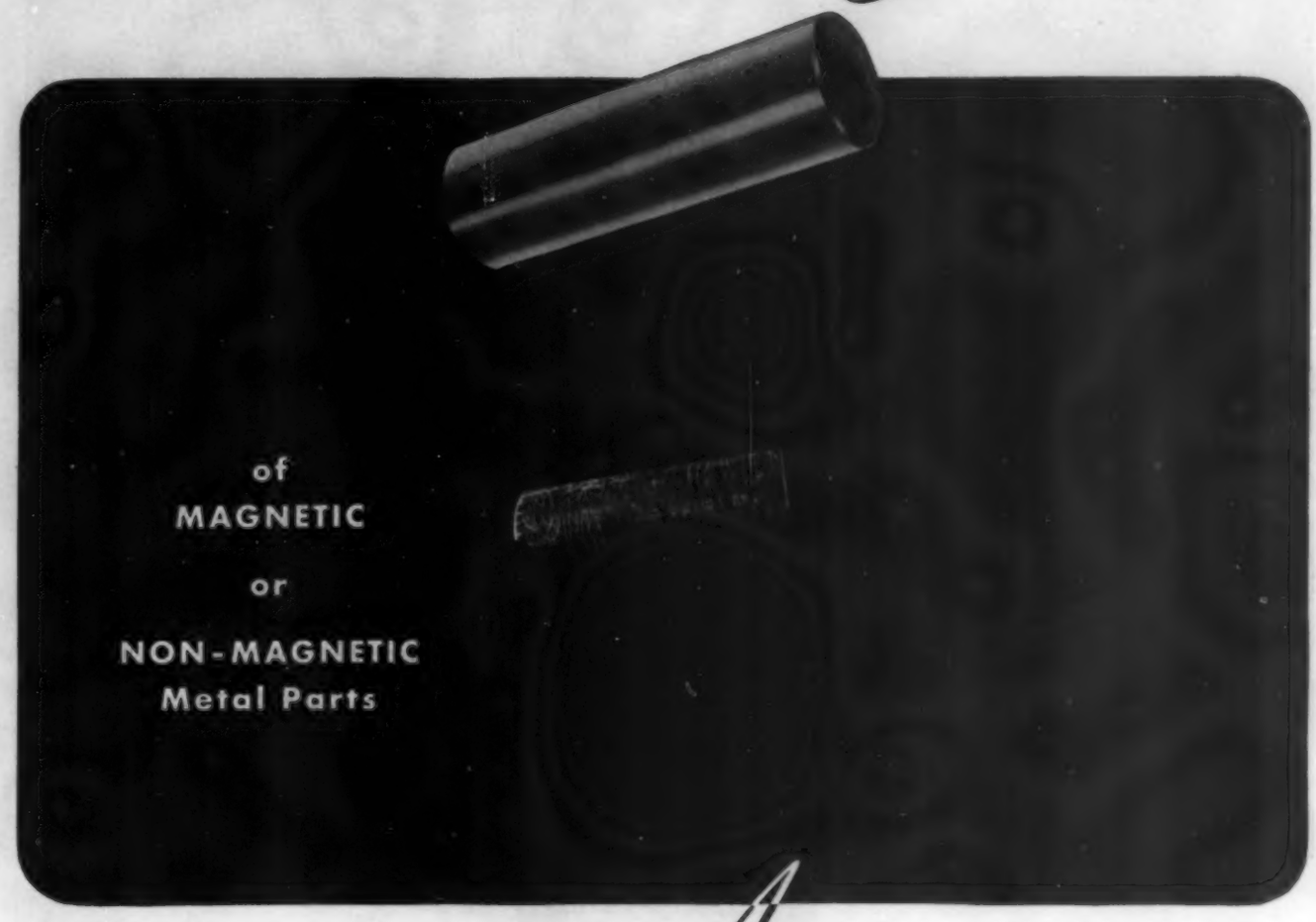


To conserve nickel and chromium, all industry is cooperating to limit the use of stainless steels to vital applications where only stainless will do the job. For such applications Copperweld Steel Company is furnishing Aristoloy Stainless steel bars and billets. We'll be glad to discuss your stainless steel applications with your engineering staff.

COPPERWELD STEEL COMPANY **WARREN, OHIO**

» 2 Great Strides Ahead for Production «

BLACK LIGHT *Inspection*



MAGNAFLUX *Announces*

MAGNAGLO (PATENTED)

Fluorescence under black light brings a new high visibility to flaw indications in magnetic metals by Magnaflux methods. A tremendous gain in contrast is registered compared with Industry's familiar picture of Magnaflux inspections under visible light.

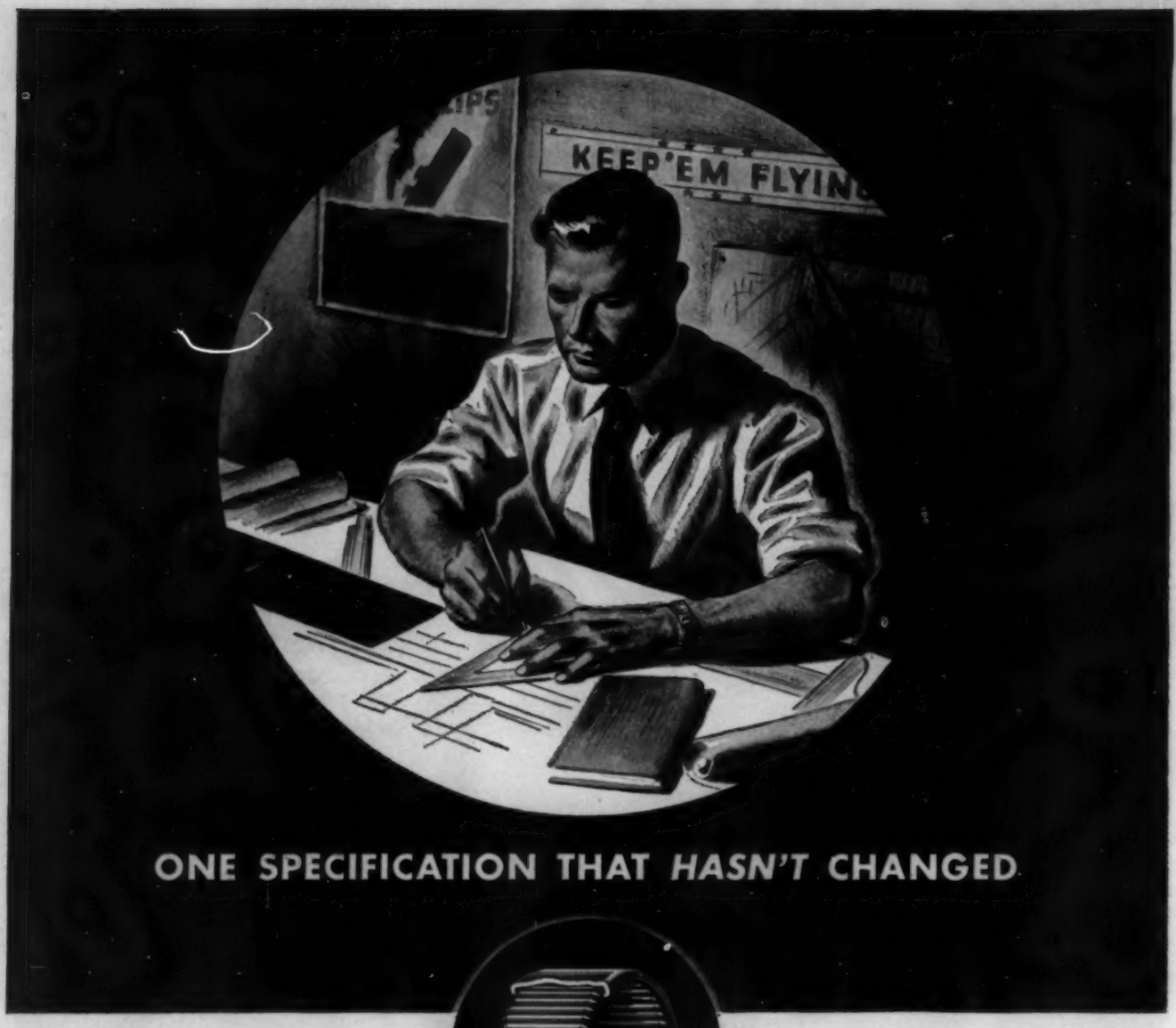
Developed and patented under the name "Magnaglo" this supplementary method produces fluorescent patterns against an unhighlighted background. Smaller indications are more readily seen. Speed of inspection is stepped up by the neon-like glow of quenching cracks, forging laps, non-metallic inclusions, bursts, etc.

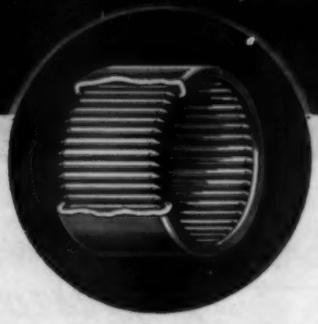
ZYGLO (PATENTED)

Fluorescent indications on *non-magnetic* parts are achieved by another astonishing Magnaflux development—the Zyglo method. Application of a highly fluorescent penetrating liquid to the test surface brings out, after removal of excess liquid, vivid glowing indications of discontinuities under black light. The entire field of non-ferrous materials is opened up to Zyglo inspections. It permits the location of flaws in aluminum, magnesium, bronze, and austenitic steels —all playing a vital part in today's production, all subject to vast improvements in use when flaws are detectable by speedy routine inspection methods.

Correspondence on applications is invited

MAGNAFLUX CORPORATION • 5912 NORTHWEST HIGHWAY • CHICAGO
NEW YORK • DETROIT • LOS ANGELES





HE used to design knitting machines; now he's working out the details of aircraft sub-assemblies. Or perhaps he has "changed over" from blueprints of streamlined trains to medium tanks—and so it goes.

He was able to take conversion in stride because of his background, resourcefulness and adaptability to new problems and requirements. You'll find fresh evidence of this every day on assembly lines all over America.

The Torrington Needle Bearing, too, has "changed over"—and its adaptability is proving itself anew—in applications where its unique advantages mean more today than ever.

Its small size, for example, is saving space and critical materials. Its remarkable ease of installation is cutting assembly time . . . its low coefficient of friction, assuring smooth performance . . . its high capacity and efficient lubrication, reducing the need for replacement or maintenance attention—all are vital wartime features.

It is not surprising, then, that engineers and designers, in changing over to war production, have found the Needle Bearing to be one of the important specifications they haven't had to change.

***FOR INFORMATION** concerning capacities and sizes, send for Catalog No. 110. Or consult a Torrington engineer. He is an expert in adapting the Needle Bearing's advantages to specific problems.*

THE TORRINGTON COMPANY
TORRINGTON, CONN., U. S. A. • *Est. 1866*
Makers of Needle and Ball Bearings
New York Boston Philadelphia Detroit
Cleveland Seattle Chicago Los Angeles
San Francisco Toronto London, England

TORRINGTON NEEDLE BEARING

Every feature fills a wartime need

IT'S A GREAT SHEET FOR PAINTING

NEW CONTINENTAL *Lead-Sealed* SHEETS

CONTINENTAL STEEL CORP. · STEEL · *Lead-sealed* TRADE MARK REG. U.S. PAT. OFF. SHEETS · KOKOMO, IND. ·

Here's a new steel sheet with definite advantages for manufacturers. For one thing, Continental's new LEAD-SEALED takes and holds paint without preparatory treatment. Because it carries a lead coating applied by a new process developed by Continental, this new sheet provides a painting surface far superior to galvanized sheets.

But LEAD-SEALED has other important advantages: Its lead coating does not fracture or peel in forming operations. The sheet is softer and more ductile because the coating reaction with the base metal does not stiffen it. It solders easily without flux or acid. Its lead coating serves as a lubricant in die forming.

Because of these qualities, Continental LEAD-SEALED is well adapted for a wide range of manufactured products where galvanized sheets formerly were used.

Sales of Continental LEAD-SEALED are governed by priority restrictions. However, we will be glad to furnish further information and samples of this revolutionary new sheet on request.

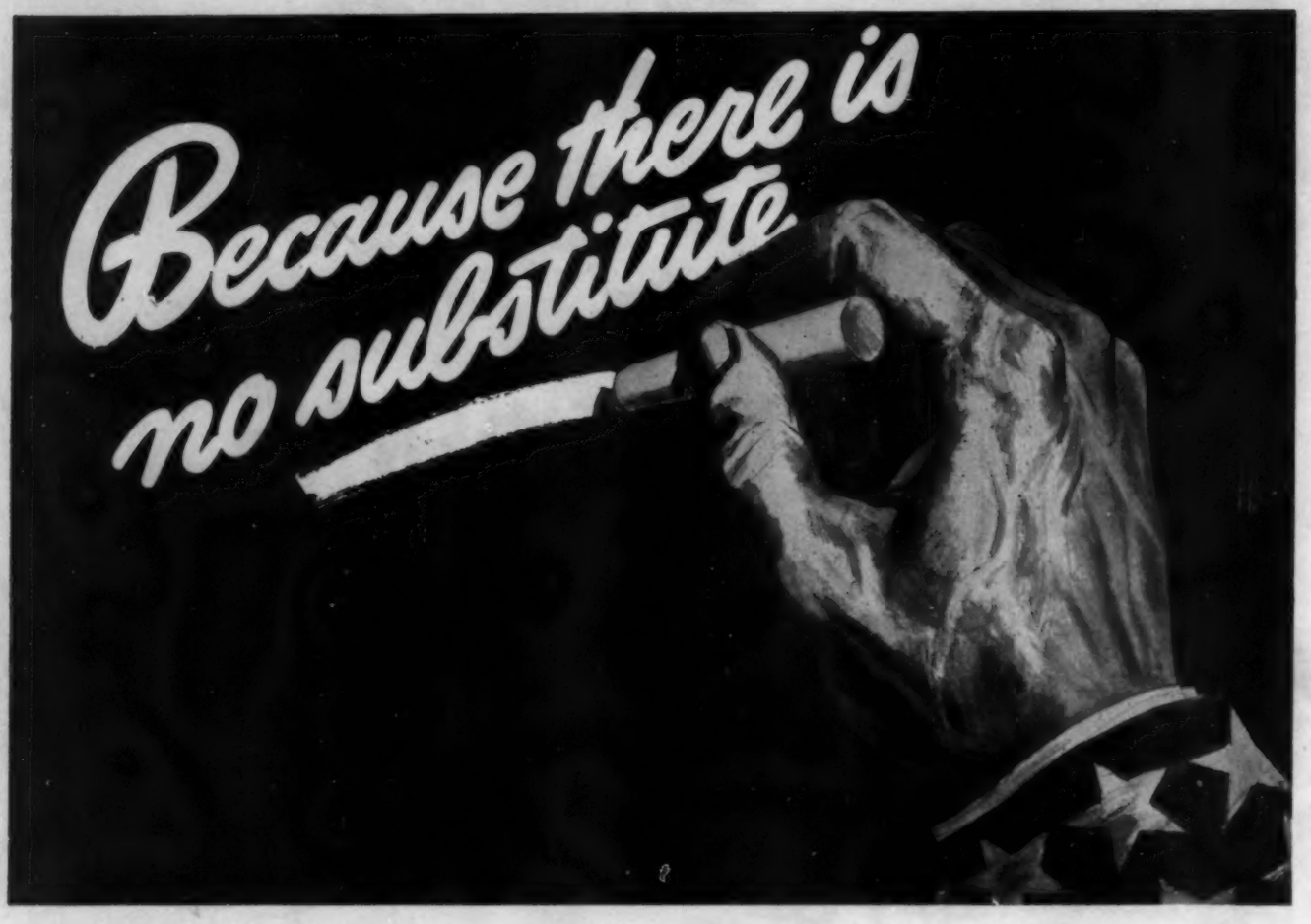
CONTINENTAL STEEL CORPORATION, Kokomo, Indiana
(Plants at Canton, Kokomo, Indianapolis)

SUPERIOR

CONTINENTAL STEEL CORPORATIOI

For more rust protection ★ ★ ★ per dollar—you need ★ ★ ★

HOT DIP GALVANIZING



Because Hot Dip Galvanizing provides a *thicker* coating of zinc . . . because Hot Dip Galvanizing *fuses* the zinc into the metal beneath and makes this heavier coating an *inseparable* part of the product . . . because the laws of chemistry do not change, you can be sure that *genuine* Hot Dip Galvanizing will certainly give you greater rust protection per dollar . . . This is why National Defense requires *Hot Dip* Galvanizing on so many things . . . This is why so many companies demand that all their galvanizing work be done by *members* of this association . . . Write for literature and learn the facts about rust prevention and galvanizing.

AMERICAN HOT DIP GALVANIZERS ASSOCIATION, INC.
American Bank Building · Pittsburgh, Pennsylvania

IF IT CARRIES THIS SEAL IT'S A JOB WELL DONE

Acme Galvanizing, Inc., Milwaukee, Wis. ★ Acme Steel & Malleable Iron Works, Buffalo, N.Y. ★ American Tinning & Galvanizing Co., Erie, Pa. ★ Atlantic Stamping Co., Rochester, N.Y. ★ Atlantic Steel Co., Atlanta, Ga. ★ Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N.Y. ★ Diamond Expansion Bolt Co., Inc., Garwood, N.J. ★ Equipment Steel Products Division of Union Asbestos and Rubber Co., Blue Island, Ill. ★ The Fanner Mfg. Co., Cleveland, O. ★ John Finn Metal Works, San Francisco, Cal. ★ Galvanizers Incorporated, Portland, Oregon ★ Thomas Gregory Galvanizing Works, Maspeth, N.Y. ★ Hanlon-Gregory Galvanizing Co., Pittsburgh, Pa. ★ James Hill Mfg. Co., Providence, R.I. ★ Hubbard & Co., Oakland, Cal. ★ Independent Galvanizing Company, Newark, N.J. ★ International-Stacey Corp., Columbus, O. ★ Isaacson Iron Works, Seattle, Wash. ★ Joslyn Co. of California, Los Angeles, Cal. ★ Joslyn Mfg. & Supply Co., Chicago, Ill. ★ L. O. Koven & Brother, Inc., Jersey City, N. J. ★ Lehigh Structural Steel Co., Allentown, Pa. ★ Lewis Bolt & Nut Co., Minneapolis, Minn. ★ Missouri Rolling Mill Corp., St. Louis, Mo. ★ The National Telephone Supply Co., Cleveland, O. ★ Penn Galvanizing Co., Philadelphia, Pa. ★ Riverside Foundry & Galvanizing Co., Kalamazoo, Mich. ★ San Francisco Galvanizing Works, San Francisco, Cal. ★ The Sanitary Tinning Co., Cleveland, O. ★ Standard Galvanizing Co., Chicago, Ill. ★ Wilcox, Crittenden & Company, Inc., Middletown, Conn. ★ The Witt Cornice Company, Cincinnati, Ohio

Guarding the Power behind the Guns

WITH VAN DORN ARMOR

There's plenty of hitting power in Army field guns. But how often they strike at enemy forces depends a lot on that wall of armor that protects the gun crew. We must keep that guard up—and make it strong.

That's what Van Dorn is doing now—by building gun shields to keep our artillery in action. We're also making aircraft armor to keep our sky fighters flying—tank armor to keep our rolling fortresses firing.

Van Dorn has been chosen for this war work because we can do it to a master's degree. We're veterans of 64 years in metal fabrication. We know armament production from World War I experience. We have an army of skilled craftsmen on duty. We have great batteries of modern, high-speed metal working equipment. And we've put it all to work 24 hours a day for Uncle Sam.

We know that the faster and better we do our war job the sooner we'll win a quick and decisive Victory—and again be able to put our expert metal fabricating service to work for free American enterprise.

THE VAN DORN IRON WORKS COMPANY

2685 EAST 79th STREET • CLEVELAND, OHIO

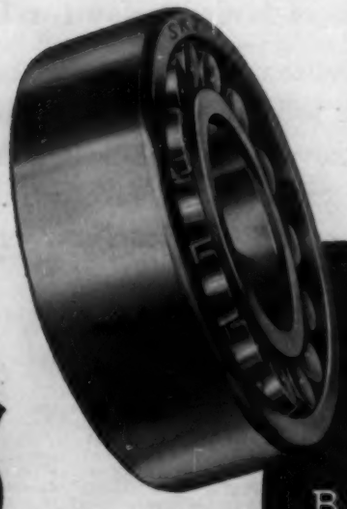
DESIGNERS AND BUILDERS OF PRISON EQUIPMENT SINCE 1878

Built by
United Engineering & Foundry Co.

WELL-DESIGNED to Fight In the Battle for Production

Today—with CONTINUOUS service and peak demand—steel manufacturers appreciate the many advantages of a reliable Gear Reduction Drive—United's 3000 h.p. double reduction double input drive that's built to stand up under the terrific punishment meted out in the Battle for Production. They also appreciate the fact this drive has SKF Spherical Roller Bearings on all shafts. SKF's built-in alignment compensates for shaft movement without binding. Full load carrying capacity is always available. And gear life is extended because original shaft centers are maintained. The well-designed product is SKF-equipped . . . always. 5086

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA.



SKF

BALL AND ROLLER BEARINGS

Lower-Carbon Ferrochromium Facilitates the Production of Chromium Steels

The use of ferrochromium containing 2 per cent carbon for the production of chromium steels in the open hearth adds less carbon to the bath. Hence less time is required to oxidize the bath to obtain the desired final carbon content. This decreases subsequent deoxidation, lowers furnace maintenance, saves furnace time, increases furnace output, and yields higher recoveries of chromium . . . In addition, lower-carbon ferrochromium inhibits the formation and segregation of hard chromium-carbide areas and produces a more uniform steel. This facilitates subsequent fabrication.

Our metallurgists can tell you more about lower-carbon ferrochromium and the many other "Electromet" ferro-alloys. They can also give you practical, on-the-job help in using these materials to improve the quality of your steel, and to increase the speed with which it can be made. This service, based on more than 35 years' experience in the production and use of ferro-alloys, is available without obligation.

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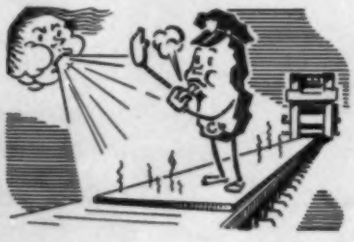

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Milwaukee MILLING MACHINE

Radio research and production given great impetus by war. See page 78

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HIGHLIGHTING

this issue of STEEL

NEWS Now in the making is the War Labor Board's decision as to whether Little Steel should accede to the CIO request for a pay increase of $1 per day and for the closed union shop. "Little Steel" made a strong protest against allowance of this increase, saying it would be an "invitation to inflation" (p. 48); it expressed doubt of the board's authority to render such a decision, particularly because it would be contrary to President Roosevelt's recent declaration that wages must be stabilized. Protest also was filed against the closed shop demand. E. L. Shaner, STEEL's editor-in-chief, believes the country is in for serious trouble should wages be determined by employers' "ability to pay" (p. 45).

A new advisory committee has to do with transportation on the Great Lakes (p. 54); more industry advisory committees have been appointed in the metalworking field (p. 61).

Large cargo planes now are under consideration as potential media for solving the problem of long-range transportation of troops and military supplies—also oil and motor fuel (p. 66).

A new air-raid siren produces the "loudest sustained noise ever produced by mechanical means" (p. 64).

STEEL again has revised its Guide to Priorities, Allocations, Prices. It appears as Part 2 of this issue. Additional changes since Part 2 went to press appear in Part 1, p. 53.

PRIORITIES War orders will be rerated to permit of more flexibility in the priorities system (p. 57). New ratings will be AAA, AA-1, AA-2 and so on. As a result A-1-a soon will be a low rating.

PRODUCTION Steel ingot production lost 1 point last week, dropping to 97½ per cent (p. 51). Need for repairs accounted for some of the loss but the major cause was lack of scrap. Scrap outlook for next Fall and Winter are rather gloomy. On the other hand the nationwide drive for iron and steel scrap, to begin this month, and to be spearheaded by a gigantic advertising campaign to be conducted by the American Iron and Steel Institute, may change the recent trend, particularly because it is estimated that dormant scrap now comes to some 5,000,000 to 8,000,000 tons (p. 52).

War production continues to gain. War shipments by the automobile industry in April were 46 per cent greater than in February (p. 54). On the other hand, more instances are reported where manufacturers of war goods are handicapped by inadequate stocks of certain parts here and there needed for completion of assemblies (p. 129). Such cases usually are due to shortages of material.

The Bureau of Mines is being reorganized to expedite production of strategic and critical minerals for the war program (p. 58); new processes it has developed will be put to work.

Imports of Bolivian tin ores and concentrates will be enlarged (p. 58).

SUBSTITUTION A large warehouse distributor is stocking the NE steels so as to be in a position to supply small lots of them for experimental purposes (p. 70).

Since the United States obtains cobalt from the Belgian Congo, the possibilities that these supplies might be cut off focuses attention on substitutes for this element in cobalt high-speed steels and other applications where red-hardness is necessary. Analysis of a report on this situation is timely (p. 80).

TECHNICAL W. C. Troy and W. E. Mahin continue their discussion on heat treating of chromium-carbon stainless steels (p. 82). . . C. E. Sims and F. B. Dahle of Battelle Memorial Institute point out (p. 86) how converters can expand capacity for producing steel castings. . . Highly developed crane cab air conditioners (p. 89) occupy only one square foot of cab floor space.

The fact that most any arc welding operator can follow a seam with his electrode at rates approaching 3600 feet per hour indicates that there are potential welding speeds much in excess of usual manual arc welding speeds, says E. W. P. Smith (p. 90) as he points out that it is possible to increase arc speeds *now* to weld more effectively. He shows how 8500 trained welding operators could be made available immediately if only half of present welding were speeded by changes now possible.

Better materials handling schemes described by F. L. Spangler (p. 100) are found to double the number of engine tests per cell in the Buick Motor plant now producing large double-row radial aircraft engines for the armed forces.

MARKETS Certain exceptions are allowed under the iron ore price ceiling (p. 54).

Switch to NE Alloy Steels

to Save Critical Metals

TO HELP conserve nickel, chromium, vanadium and other scarce metals, the War Production Board's ablest metallurgists have developed NE (National Emergency) Alloy Steels. These new steels contain relatively small quantities of alloying elements in such combination as to produce physical properties usually attributed to steels of much higher alloy content. The War Production Board stipulates the use of the new NE Alloys to *replace* the standard SAE and AISI Alloy Steels for a wide range of applications.

Ryerson NE Alloy Steel stocks in six specifications, all fine grain, will be available shortly; and will consist of sizes ranging from ½-inch to 7-inch rounds, in three groups:

Carburizing Grades	*Medium Hardening Grades*	*High Hardening Grades*
NE 4023 and NE 8620. To Replace AISI and SAE Nos. A 2300, A 2500, A 3100, A 4100, A 4600, A 5100, A 6100.	**NE 4042 and NE 8744. To Replace AISI and SAE Nos. A 2330-35, A 3130-35, A4130-35, A5130-35, A6130-35.**	**NE 4047 and NE 8749. To Replace AISI and SAE Nos. A 2300, A 3100, A 3200, A 4100, A 4600, A 6100.**

Only limited data on heat-treatment response or physical properties will be available when NE Alloys are first ready for shipment. The WPB is anxious to know how these new steels will function and requests all NE Alloy users to report results in working with these new steels. Ryerson will cooperate fully with users, supplying laboratory test data, and all other available information.

• • •

If you now use Alloy steel, let Ryerson help you in adapting NE Alloys to your requirements wherever possible. Write, wire or phone the nearest of the ten Ryerson plants.

JOSEPH T. RYERSON & SON, *Inc.,* Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

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AS THE EDITOR VIEWS THE NEWS

STEEL

July 6, 1942

LABOR POLICY WILL GET WORSE BEFORE IT GETS BETTER

This nation's wartime labor policy is going from bad to worse. It is difficult to see how the findings of the Fact-Finding Panel of the National War Labor Board in the dispute between the employers and employes of "Little Steel" can result in anything but confusion and demoralization.

We say this reluctantly and with full realization of the fact that the members of the panel were in a tough spot. Undoubtedly they worked sincerely and hard to make the best of an assignment made difficult by past errors in wartime labor policy.

Nevertheless, they have turned in a report that is loaded with dynamite. It is no exaggeration to say that the implications of their "findings" constitute a greater threat to national security than would have resulted from an outright grossly unfair decision in the "Little Steel" case.

Finding No. 1 in the panel's report is that all four companies "are able" to pay the requested wage increase of $1 per day. Are we to assume from this that "ability to pay" henceforth is to be a determinant in the fixing of wage scales? If so, we are in for serious trouble.

For instance, how many employes would be willing to have their wages determined by "ability to pay" in time of depression? Also, if "ability to pay" is to be a factor, what will happen to employes of companies which operate in red through frequent and sometimes extended periods? The mere reference to "ability to pay" by the panel will prove to be another tactical error in the long list of blunders in wartime labor policy.

In Finding No. 8 the panel expresses its belief that "general economic conditions are the principal cause of changes in wage rates." It is difficult to reconcile this naive statement with the very apparent policy of NWLB to encourage pressure blocs, politics and expediency to supplant economic conditions as the major determinant in fixing wages.

The panel is curiously silent about President Roosevelt's recent admonition to stabilize wages as a curb against inflation. It also ignores the fundamental question of what is reasonable compensation for service rendered.

Regardless of how the steel wage dispute turns out, this nation should begin now to divorce wage policy from politics.

E. L. Shaner

Editor-in-Chief

Inflation Inevitable If Wages Are Increased, "Little Steel" Declares

✦

Protests to War Labor Board against panel's "able-to-pay" report . . . "Finding of Facts" in conflict with President's policy, threatens serious maladjustments . . . Board faces union labor pressure group

✦

WASHINGTON

"INVITATION to inflation" was issued last week by a fact-finding panel of the National War Labor Board which reported four independent steel companies were "able to pay" $1-a-day wage increase to employes. This was the general view in Washington—outside of organized labor circles—as the board proceeded to hear final arguments by representatives of companies and unions.

If sanctioned by the board, the panel's "facts", it was stated, will touch off an inflationary spiral which will wreck the anti-inflation program enunciated by the President April 28; will have disastrous effects on our war-time economy, and lay the groundwork for serious post-war maladjustments.

The panel's report was considered to be a direct contradiction to Mr. Roosevelt's admonition to labor: "You will have to forego higher wages for your particular job for the duration of the war."

The report affects not only the four companies involved, not only the steel industry as a whole, but all industry. Steel long has been a bellwether—along with the automotive industry—as regards wages. Records show that soon after the steel industry or the automotive industry has granted wage increases, there has been a general and comparable rise in all wages. It happened in 1936, in 1937 and in 1941. It easily can happen again.

The report, based upon the reasoning that the requested increase would cost the companies involved only a minor sum—the bulk to be compensated by lower federal taxes—drew widespread criticism in Washington and elsewhere.

One WPB official declared it was "worse than Tobruk", and that if it were approved by the board it would be "worse than Pearl Harbor". Business men, economists and commentators here said that if the board issues a "directive" to grant the increase the price control system so laboriously built up will crack wide open.

Split on Union Security

A 12½-cent increase in wages—which the panel found the "Little Steel" companies "able to pay"—would cost the steel industry $160,000,000 annually. If extended to the railroads, the carriers would be forced to increase wages by $375,000,000. For all industries covered by old age and survivors insurance, the increased cost would be $8,600,000,000. Total wage increase is estimated to amount to about $9,000,000,000, if comparable increases are granted.

If employes in other industries should not receive comparable increases in their wages, they would suffer a disproportionate burden of the war effort in comparison with the steelworkers.

The panel split on the issue of union security. The Steel Workers Organizing Committee (now the United Steelworkers of America) requested a union shop. In earlier directives the NWLB ordered "maintenance of membership" in similar cases.

Decision by the board on the panel's report was awaited with grave misgivings. Upon its action may rest the board's own future. It may grant the wage increase which would appear to be in conflict with the President's policy, or, it may incur the wrath of organized labor by repudiating the wage increase and upholding the anti-inflation program.

Whatever action it may take will be weighed in the "court of public opinion", as was aptly phrased by Edward L. Ryerson, chairman, Inland Steel Co., in a statement to the board last week. He spoke "not to make an argument, but to present point of view." He questioned the board's power to impose the wage increases demanded by the union or to impose any form of union security.

Findings by the panel were generally considered susceptible to specific criticism. April 1, 1941, was selected as a base for comparing wages with the increased cost of living as of March 15, 1942. Had March 1, 1941, been chosen as the living cost basis, it could have been demonstrated that wage increases and living costs were parallel for the year following. Steel wages were raised 10 cents an hour effective April 1, 1941. Selection of the wage level as of that date was criticized as "obvious evasion and favoritism in bookkeeping."

Another fallacy in the report is the assumption that if the companies are "able to pay" the increase should be granted. While, as the panel points out, the companies would have to pay only 6 or 11¼ per cent of the increase asked, it is doubtful that the union would agree to base wage rates on the "ability to pay" after the war is over and operations are lower. Furthermore, by reducing federal revenue by exempting a large segment of otherwise taxable income, a greater burden is placed upon other taxpayers who may not be so fortunate as to have a recommendation for a wage increase.

Panel was composed of Arthur S. Meyer, New York Board of Mediation, representing the public; Cyrus S. Ching, vice president, United States Rubber Co., representing the employers; and Richard T. Frankensteen, United Automobile Workers of America, representing the employes.

Its report was vigorously protested by representatives of the companies involved, on both the wage increase and the union security issues when public hearings opened before the full board, Wednesday.

E. G. Grace, president, Bethle-

HEARINGS on the "Little Steel"-United Steelworkers of America case opened last Wednesday before the National War Labor Board in Washington. CIO President Philip Murray made the opening statement in support of the union's demand for a $1-a-day wage increase and union security. Shown is a scene of the opening session. NEA

hem Steel Co., said: "There is no place for opportunism by anyone in these critical days. That applies both to industrial wages and to industrial profits. Industrial profits, in my opinion, ought not to exceed a conservatively fair level. Whenever they do, they should not be used to increase returns to investors nor as general wage advances for workers, but should be used to help pay the cost of winning the war."

T. F. Patton, general counsel for Republic Steel Corp., objected to the wage increase on the following grounds:

"1—The increase would be in violation of the national wage stabilization program.

"2—There are no substandard wage levels in Republic, by comparison to other companies or other industries, on which to ground any order for a wage increase.

'3—The fact that men in some other industries working many hours of overtime are receiving larger net wages is not proper ground for raising base rates in steel.

"4—The proposed wage increase is not justified on the ground of rising living costs. From August, 1939, to March, 1942, steel weekly wages have increased 23.7 per cent and living costs only 13.7 per cent."

Rejection of the union's demands is required by the "highest consideration of public policy," John Gall, counsel for Youngstown Sheet & Tube Co., told the board. Mr. Gall said the industry's ability to pay the requested wage increase, as found by the panel, was not established by the record.

All the companies registered opposition to the checkoff and union security demands.

If any wage increase is granted by the board, it will be retroactive to the date of certification of the case, April 24.

"Court of Public Opinion" To Judge WLB's Decision, Warns E. L. Ryerson

"I appear before your board, not to make an argument, but to present a point of view," said Mr. Ryerson. "My purpose is to state clearly the deep convictions that Inland Steel holds with respect to the vital issues which are at stake in this case . . .

"I first refer to what is called union security. You have overruled our protest and have declared that you possess the authority to decide this question. I shall, therefore, not pursue that matter further at this time, but we must reserve the right to question your authority in the forum of public opinion. We do not believe that the people of the United States have acquiesced in taking from Congress the power to limit the personal freedoms of the millions of workers throughout the nation. However, since you believe that you possess that immense power, I address myself directly to the responsibility which rests upon you in the exercise of it.

"In the public discussion of the question of union security three tests have emerged which are claimed to justify its requirement in particular cases. These are: First, inter-union rivalry in the plant; second, anti-labor bias of the employer; and third, the effect on war production.

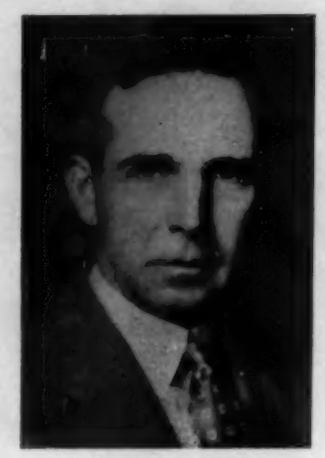
"Not one of these factors exists in the case of Inland.

"There is no inter-union rivalry at Inland plants. The National Labor Relations Board has determined the bargaining unit and the bargaining agency. No one questions that this union is the exclusive bargaining representative.

"Inland is not pursuing an anti-union policy. For five years honest collective bargaining has gone forward in our plant with this union. Every member of the local knows that to be true, and at this moment we are prepared to sign a contract which we negotiated substantially to completion last fall, except for the matters here in issue.

"War production at the Inland plants could not be improved by union maintenance. Since long before Pearl Harbor our plants have been running in excess of rated capacity.

"I say to you, therefore, thoughtfully, that if you should order Inland to accept union maintenance the public of the United States could draw but one conclusion. They would be forced to believe that you had committed yourselves to a social formula which you have determined shall be imposed upon American industry. By such action you would say



E. L. Ryerson

to American industry that you have embarked upon social legislation.

"On the economic aspect of this case, it must be clear to all intelligent people that the question of whether the steelworkers should be granted a wage increase of $1 a day is a national question. Its impact upon the business of our company would be relatively unimportant, but its impact upon the nation would be serious. The government would pay about 90 per cent of any wage increase granted and the effect of this upon the nation's burden of debt and upon the entire war economy would be far reaching.

"Certainly the public believes that the President of the United States, from whom alone this board draws its power, issued a directive to you gentlemen in his recent radio address to the nation.

"He said: 'We must stabilize wages.'

"Does anyone think for a moment that it would be a step toward the stabilization of wages for this board to grant to the steelworkers any increase, when it must be obvious to all that whatever increase is here granted will forthwith be demanded by every other union in the country?

"Or, can anyone believe that the minimum hourly rate of 72½ cents applying to 3 per cent of our employes and the average hourly earnings of $1.03 covering all of our employes are substandard—even compared with present day living costs? And, I may add that our average is 5 cents above the industry average.

"And on this issue, as on that of union security, the entire public of the United States awaits your decision in this case with greatest anxiety as to what the consequences may be."

Highlights of Panel's "Able-To-Pay" Wage Report

Briefly summarized, the highlights of the panel's findings are as follows:

1. "The panel finds that all four companies are able to pay the requested wage increase of $1 a day."

2. "Profit taxes represent the government's opinion of the extent to which the government should share in the net profits of business after all other expenses, including labor costs, have been deducted. To propose that wages should be affected by profit taxes, is to propose that labor's return should be conditioned by the government's impost on industry."

The companies' earnings before federal profit taxes are ample and represent the proper criterion of ability to pay, the panel pointed out. The panel also pointed out, however, that the companies would pay only a small part of any increased labor costs—11¼ per cent under the Treasury profits tax proposal and 6 per cent under the Ways and Means proposal. The balance would cost the companies nothing.

3. "The panel finds that if a wage increase, otherwise proper, is withheld because of its effect on governmental revenues per se, such withholding would involve an unauthorized tax on workers."

4. The panel found that in March, 1941, the month before the steel wage increase last year, the hourly earnings in the durable goods industries were 12 per cent less than they were in the steel industry. During the past year, this relationship has changed so that for the year 1942 the panel estimates the hourly earnings in durable goods will be only 7.9 per cent less than steel, a shift of 4.1 per cent.

In March, 1941, the hourly earnings in all manufacturing industries were 20 per cent less than steel, whereas, for the year 1942 they are estimated to be only 17.2 per cent less, a shift of 2.8 per cent.

Expect Greater Shift

The panel estimates an even greater shift in the relationships, when calculated on a weekly basis. Its figures show that in March, 1941, the weekly earnings in durable goods were 4.2 per cent less than the weekly earnings in steel, whereas for the year 1942 durable goods will be 7.8 per cent above steel, a shift of 12 per cent. In March, 1941, the weekly earnings in all manufacturing were 16.6 per cent below steel, whereas, for the year 1942 they will be only 7.5 per cent below, a shift of 9.1 per cent.

5. The panel's estimates have been made on the assumption that there will be no increase either in wage rates or in hours of work after the month of May, 1942. The panel, however, has drawn attention to the fact that it is highly probable that hours of work will continue to increase throughout the year, except in steel. Steel is a three-shift industry working at capacity and there is no elasticity for increase of hours. The fairly stable weekly hours worked in steel and the continually increasing hours in durable goods and all manufacturing have accounted in great degree, according to the panel, for the shift in relationships which have occurred during the past year.

6. "The panel further finds that a greater weight is normally given to hourly earnings because hourly earnings fix costs and because it is proper that the worker should be paid according to the extent of his labor . . . Weekly earnings should be given more than their usual weight in the present determination of a just wage for the steelworkers."

The panel also found that the comparisons between steel and durable goods and steel and all manufacturing are pertinent, though the former is more to the point. It also found that "contrasts between present comparative relations of industries and past comparative relations are pertinent, though not controlling."

7. "The panel finds that from March, 1941, to March, 1942, the cost

NATIONAL WAR LABOR BOARD that will decide the big issue in the "Little Steel" controversy was appointed early in January by President Roosevelt, and replaced the National Defense Mediation Board.

Four members of War Labor Board are officials of labor unions.

Four members are business men, to represent employers.

Three members are university professors, to represent the public. A fourth member in this group is a patent lawyer, serving as chairman of the board.

Seated, left to right:

George W. Taylor, University of Pennsylvania economics department, vice chairman of the board.

Chairman William H. Davis, New York patent attorney.

Frank P. Graham, president, University of North Carolina.

Standing, left to right:

E. J. McMillan, president, Standard Knitting Mills Inc.

Mathew Woll, vice president, American Federation of Labor.

Walter C. Teagle, chairman, Standard Oil Co. of N. J.

A. W. Hawkes, president, Congoleum-Nairn Inc., and president, United States Chamber of Commerce.

Roger Lapham, president, American Hawaiian Steamship Co.

George Meany, secretary-treasurer, AFL.

Thomas Kennedy, secretary-treasurer, United Mine Workers of America-CIO.

R. J. Thomas, president, United Automobile Workers-CIO.

A twelfth member, Dean Wayne L. Morse, University of Oregon Law School, was not present when photo was taken.

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of living for steel towns advanced 14 per cent; average weekly earnings in the steel industry advanced approximately 13.1 per cent, and average hourly earnings advanced approximately 14.6 per cent."

The panel then compared the changes in the cost of living which had taken place since the general steel wage increase in April, 1941, with the changes in weekly earnings since April, 1941, and concluded:

"The panel believes that weekly earnings are the proper criterion for measuring the impact of rising living costs and therefore finds that the buying power of the earnings of the steel worker has decreased approximately 13.3 per cent since the last general change of wage rates in the steel industry."

8. "Inland has said that in the past, increase in steel wages spread like wildfire throughout the other industries in the country and that the same thing would happen again . . . The panel believes that general economic conditions are the principal cause of changes in wage rates, rather than any specific change in a particular industry . . .

"It is clear that the national money income shares importance with the consumer's pie, and that, though the latter will shrink, the former will grow. To ask labor to accept less than its proportionate share of the nation's money income in order to prevent labor from acquiring too much pie leaves out of account that money has value even when it must be saved."

9. "Inland and Youngstown are either presently complying with or are willing to comply with" the union's request for a minimum daily wage guarantee. "Granting the request would involve no direct additional cost to the companies."

10. "The functions of this union, in particular, are today of vital significance and its maintenance is socially desirable . . . Union security, in the form of maintenance of membership, united with the check off would—(a) make shop conditions more peaceful by diminishing friction and eliminating the solicitation of dues, (b) reduce the cost of dues' collection and benefit the union accordingly, (c) release the time of union membership and management addressed to the elimination of grievances and to a concerted effort to achieve maximum production."

Cyrus Ching dissents from this finding because "he does not believe union maintenance should be imposed in these cases." Richard T. Frankensteen dissents because "he finds the facts in these cases warrant . . . the union shop." The panel was unanimous on everything except this issue.

Other excerpts from the panel's report follow:

"1. The United Steelworkers of America has contracts with firms producing 60 per cent of the total tonnage of the entire steel industry covering more than 600,000 employes. This does not include the four companies involved in this case, which produce about 32 per cent of the total tonnage.

"2. The union's dues are $1 a month. The initiation fee is $3. The union has never levied special assessments.

"3. The union was designated the sole collective bargaining agent in the plants of the four companies in the summer and fall of 1941 when it won National Labor Relations

Board elections in Bethlehem by a majority of 70 per cent and showed the NLRB by a check of union membership records that between 70 per cent and 75 per cent of the eligible employes in the other three companies were members of the union.

"4. The union bases its demand for a general wage increase of $1 a day on the following arguments:

"(1) The steelworker has not received his share of the savings through increased productive efficiency in the steel industry.

"(2) The wages of the steelworker are inadequate when judged by standards of health and decency.

"(3) The companies are able to pay the increase demanded.

"(4) Comparable wages justify the demand.

"(5) The change in the cost of living justifies the demand."

"5. The panel finds that the union cannot ground a demand for a wage increase on the reallocation of savings through increased productive efficiency in the steel industry."

"6. The average annual income of steel workers was $1926.72 in the year 1941 . . . The panel finds that the union has not sustained its contention that wages in the steel industry are inadequate when judged by standards of health and decency."

"7. The $1 a day increase would cost Bethlehem, $23,000,000; Republic, $16,500,000; Youngstown, $4,700,000; Inland, $3,300,000.

"The 1941 earnings of the four companies before federal profit taxes were: Bethlehem, $119,758,000; Republic, $70,288,000; Youngstown, $37,624,000; Inland, $38,079,000.

"8. If the union receives the $1 a day increase, the 1942 earnings of the companies prior to Federal profit taxes would be in round figures as follows: Bethlehem, $90,000,000; Republic, $50,000,000; Youngstown, $30,000,000; Inland, $30,000,000.

"It will be noted that in each case the figure is substantially greater than any year in the 1931-1940 decade, and is in the case of Bethlehem over six times, Republic over 13 times, Youngstown over 20 times and Inland over three times the average annual earnings for the period."

"The companies, or some of them, have questioned whether earnings before profit taxes are a proper criterion of ability to pay, and base their claim of inability, or at least of unfairness, on the premise that earnings after profit taxes are a fairer and more practical guide.

"Profit taxes represent the government's opinion of the extent to which the government should share in the net profits of business after all other expenses, including labor costs, have been deducted. To propose that wages should be affected by profit taxes is to propose that labor's return should be conditioned by the government's impost on industry. The panel's finding that this neither can nor should be the case, and the panel's finding that the companies are able to pay is not affected by the results flowing from any change of policy, relating to profit taxes, on the part of the government."

9. Should the tax proposals made by the Secretary of the Treasury be adopted, "88¾ per cent of the effect of the wage advance would be absorbed by diminished taxes and 11¼ per cent would be the net fraction borne by the companies. Should the Ways and Means committee proposal be adopted, 94 per cent of the effect of the wage advance would be absorbed by diminished taxes and 6 per cent would be the net fraction borne by the companies".

Transposing these percentages into dollars, the requested wage increase will cost Bethlehem, for instance, $2,590,000 under the Treasury proposal and $1,380,000 under the Ways and Means proposal; Republic, $1,856,000 under the Treasury proposal and $990,000 under the Ways and Means proposal; Youngstown, $529,000 under the Treasury proposal, and $282,000 under the Ways and Means proposal; Inland, $371,000 under the Treasury proposal, and $198,000 under the Ways and Means proposal.

"The panel believes . . . that if increased prices should be agreed upon, they could scarcely (in the case of Bethlehem, for example) be due to a penalty of $1,380,000 attributable to wage increases under the Ways and Means tax formula, but more probably to profit taxes of $118,000,000 which Bethlehem would have to pay under that formula even though no increase in wages were granted."

10. "The panel finds that for the year 1942 hourly earnings in the steel industry will be greater than hourly earnings in durable goods and greater still than hourly earn-

(*Please turn to Page* 126)

Steel Employment Establishes Record

STEEL industry employment rose to a new record in May when 656,000 persons were employed, compared with the prior record of 654,000 in April.

Total payrolls for the industry amounted to $117,403,000 in May, compared with $118,568,000 in April. Average hourly earnings of wage workers was $101.1 cents per hour, a new peak. Average work week during May was 37.7 hours.

	Number of Employes	Total Payrolls (dollars)	Average Earnings Per Hour (cents)	Average Hours Per Week
1939				
September	502,000	69,735,000	84.7	35.0
October	545,000	83,421,000	84.6	38.0
November	561,000	86,682,000	84.7	39.5
December	563,000	84,537,000	85.0	36.9
1940				
January	556,000	82,826,801	83.5	37.1
February	538,000	70,846,559	83.4	34.1
March	514,000	68,767,962	83.6	32.3
April	503,000	67,724,000	83.6	33.4
May	510,000	75,184,000	85.1	35.7
June	535,000	77,388,000	85.9	35.9
July	549,000	82,215,000	85.6	36.5
August	560,000	83,837,000	85.1	36.7
September	565,000	82,068,000	85.4	36.5
October	568,000	90,768,000	85.6	39.4
November	577,000	87,921,000	86.2	38.2
December	585,000	91,233,000	86.5	37.6
1941				
January	598,000	96,234,000	86.6	39.2
February	603,000	89,586,000	86.9	39.4
March	613,000	98,025,000	87.7	38.5
April	621,000	108,557,000	97.1	39.4
May	632,000	115,267,000	98.1	39.7
June	638,000	110,504,000	99.2	38.2
July	648,000	114,059,000	99.1	37.8
August	654,000	112,757,000	98.5	37.2
September	652,000	110,392,000	98.2	37.8
October	646,000	118,890,000	98.3	40.0
November	645,000	109,856,000	99.0	37.6
December	646,000	117,221,000	99.9	38.2
1942				
January	651,000	118,785,000	99.2	39.2
February	651,000	108,563,000	99.5	39.0
March	653,000	116,998,000	100.1	38.1
April	654,000	118,568,000	100.4	39.7
May	656,000	117,403,000	101.1	37.7

Carnegie-Illinois Reports More Production Records

CHICAGO

Carnegie-Illinois Steel Corp. reports five new weekly production records were established at its Chicago district plants in the week of June 22 when they rolled "a tonnage of steel plates sufficient to provide armor plate for more than 7000 light medium tanks."

Among the records was one for blast furnace output "which topped prior records by approximately 1100 tons." Gary works blast furnaces also set a record "with total production of 83,837 net tons."

The other three records related to plates. Total plate output "increased by almost 7000 tons over the best previous record which was established the week ending June 20. The 80-inch hot strip mill at the Gary sheet and tin mills, which formerly produced lighter gage steel and was recently converted to plate production, reached a new high, as did the 160-inch continuous plate mill at Gary works."

Strike Halts Operations

Carnegie-Illinois Steel Corp. was the victim of another work stoppage June 30, when 40 hookers, loaders and cranemen at its Gary, Ind., billet mill and 40-inch blooming mill refused to work at the beginning of the 4 p. m. turn. Operations were suspended and 225 workers sent home.

At midnight, a partial crew reported and the mills were operated at 50 per cent of their capacity. However, the 40 men on the 8 a. m. and 4 p. m. turns again declined to go to work.

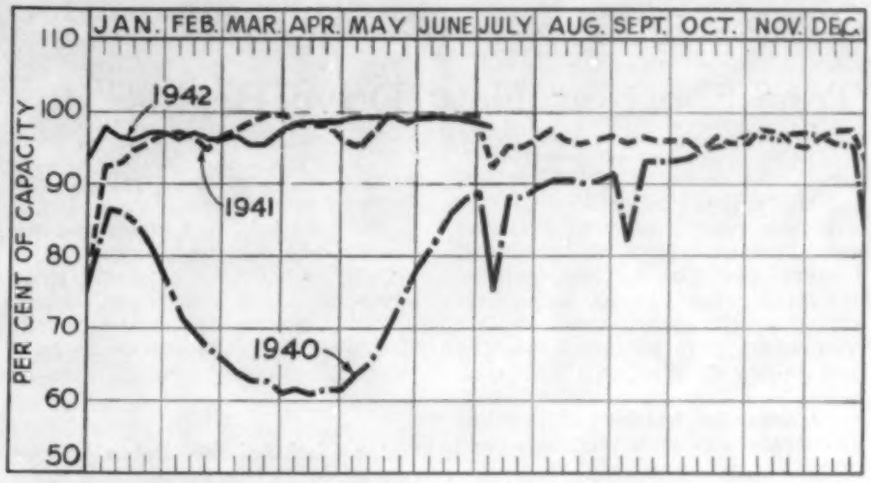
Strike was unauthorized and the union succeeded in persuading the men to return to work July 1 under threat of losing their jobs for violating union's contract with company.

1000 Records Broken by Armco Since Pearl Harbor

Breaking war-time production records has become a habit for the Ashland, Ky., division of American Rolling Mill Co.

Russell R. Smith, manager, announced July 2 the division has made 1000 production and maintenance records since Pearl Harbor, consisting of 624 operating production records and 376 maintenance records.

He also reported the division soon will more than double the total number of production records made during the entire year 1941. During June a new monthly high was set for shipments of steel, largely plates and sheets, topping the previous monthly shipping record set in May, 1941, by 1886 tons.



PRODUCTION . . . . Down

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week was down 1 point to 97½ per cent of capacity. Two districts gained, five declined and five were unchanged. A year ago the rate was 92 per cent; two years ago it was 75 per cent, both based on capacity as of those dates.

Pittsburgh — Receded 1½ points to 94 per cent, due to Independence Day interruption.

Wheeling — Gained 4 points to 83½ per cent.

Chicago — Held at 103 per cent, the highest that scrap supply will support. Two open hearths of one producer are idle for lack of scrap. Some finishing capacity shut down for the holiday.

Detroit—Three open hearths were off for repairs and the rate was down 1 point to 91 per cent.

Central eastern seaboard — Unchanged at 96 per cent, the holiday making no appreciable difference.

Birmingham, Ala.—With 23 open hearths active production continued at 95 per cent.

St. Louis — With 26 out of 28 open hearths active the rate remained at 95½ per cent. Two producers indicate lower operation early in July unless scrap supply improves.

Buffalo — Declined 2½ points to 90½ per cent as an open hearth was taken off for repairs.

Cincinnati — Advanced 2 points to 91 per cent as a shift in active furnaces was made. The holiday did not affect output.

Cleveland — Dropped 2 points to 92 per cent, a gain at one plant being more than offset by loss of one furnace at each of two plants. Steel production was not affected by the holiday.

Youngstown, O. — Three bessemers and 74 open hearths operated last week, holding production at 95 per cent for the fourth week. There was no holiday interruption to steelmaking. A serious breakout at a Carnegie-Illinois Steel Corp. blast furnace has put it out of production for a month. The same rate is scheduled for this week.

New England — Declined 5 points to 95 per cent because of furnace repairs.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended July 4	Change	Same week 1941	Same week 1940
Pittsburgh	94	− 1.5	97.5	64
Chicago	103	None	101.5	77
Eastern Pa.	96	None	92	72
Youngstown	95	None	90	70
Wheeling	83.5	+ 4	87	75
Cleveland	92	− 2	92.5	69
Buffalo	90.5	− 2.5	75.5	74
Birmingham	95	None	90	71
New England	95	− 5	90	80
Cincinnati	91	+ 2	81.5	54
St. Louis	95.5	None	98	52
Detroit	91	− 1	83	79
Average	97.5	− 1	*92	*75

*Computed on basis of steelmaking capacity as of those dates.

J. & L. Takes Over Otis Steel Plants

Jones & Laughlin Steel Corp. last week added approximately 1,000,000 tons steelmaking capacity when it formally took over control of the plants of Otis Steel Co., Cleveland. Sale of Otis, a $93,000,000 transaction, was ratified by stockholders April 24.

E. J. Kulas, Otis president, becomes a member of the board of directors of Jones & Laughlin and vice chairman of the executive committee.

Scrap Supply Reported 4,000,000 Tons Short, as New Drive Begins

NEW YORK

STRESSING importance of recovering every pound of available scrap, Robert W. Wolcott, president, Lukens Steel Co., and chairman of the scrap committee, American Iron and Steel Institute, declared last Wednesday that the steel industry was falling short of capacity operations by a rate of almost 4,000,000 tons annually, because of inability to obtain sufficient pig iron and scrap.

He said it was impossible to get more pig iron at present as blast furnaces are being operated at capacity, and he did not see any material improvement in this direction for some time to come. Consequently the industry has to look to scrap not only to contribute to maintenance of present operations but to provide for still greater use of present steelmaking capacity.

He estimated there are 5,000,000 to 8,000,000 tons of "dormant" scrap in this country which would help materially at this time and appealed to everyone to assist in the national salvage program which is to get under way later this month.

He spoke at a meeting of publicists called by McCann-Erickson Inc., Rockefeller Plaza, advertising firm, which has been selected to handle the $1,500,000 to $2,000,000 scrap-collection advertising campaign sponsored by the steel industry. (STEEL, June 8, p. 37). Purpose of meeting was to outline details.

Other speakers were Paul C. Cabot, deputy chief, Bureau of Industrial Conservation, Washington, who spoke of the nation-wide organization set up through his bureau; Edward D. Madden, vice president, McCann-Erickson; and E. C. Barringer, president, Institute of Scrap Iron and Steel Inc., who discussed the importance of scrap in the war effort. H. K. McCann presided.

Scrap Stocks 5 Per Cent Greater at End of April

Domestic stocks of iron and steel scrap at consumers', suppliers' and producers' plants at the end of April approximated 4,324,000 gross tons, an increase of 5 per cent over the 4,101,000 tons reported March 31, according to the Bureau of Mines.

The increase resulted from the fact that consumers' stocks were more than 6 per cent greater and suppliers' and producers' tonnage 2 per cent larger. The main increase came from 10 per cent larger stocks of purchased scrap at consumers' plants.

Total consumption of ferrous materials, pig iron and scrap was 9,017,000 gross tons in April, a decline of 2 per cent from March, entirely due to the shorter month. Daily average consumption in April was 1 per cent greater than in March.

Intensified Salvage Drive To Be Started July 13

WASHINGTON

Intensified nation-wide salvage program, designed to reach every home and industrial plant and increase the flow of all scrap materials, has just been announced by Donald M. Nelson, WPB chairman and Lessing J. Rosenwald, chief, Bureau of Industrial Conservation.

The campaign starts Monday, July 13.

Beginning this month, the 12,000 state and local salvage committees will have new forces at work to help them, provided by private industry working in co-operation with the Bureau of Industrial Conservation.

While the Bureau of Industrial Conservation considers the new campaign as an integrated whole, it has the following clearly defined parts:

1. An intensified campaign to collect metals, especially iron and steel, and rubber and other waste materials which will flow through regular channels of trade.

2. A waste fats campaign, in which housewives will be urged to sell their waste kitchen fats, such as bacon drippings, to meat dealers who will send them back through the normal channel of trade.

3. A tin can collection campaign which is to be carried out only in selected localities, and then only when local announcements are made.

These industry advertising campaigns will be closely integrated with the program of the Bureau of Industrial Conservation and will take advantage of the fact that the summer is the best time of year to build up stockpiles of waste material.

The national scrap harvest to be conducted in rural areas with the co-operation of other federal and local agencies and the assistance of the farm implement industry will be part of the program as the sumber advances. The program will get under way in the South and work north with the agricultural harvest season. The over-all advertising campaign will tie in with this special effort to get scrap metal out of the farm areas before its movement is handicapped by winter weather.

Officials of the bureau made it clear that all organizations which have taken a part in the program to date would continue to be used —the volunteer workers of local defense councils, the various charities who have collected waste materials, and the youth organizations which have already done an outstanding service to the nation in the collection of scrap and waste materials. For example, the Boy Scouts have already announced a national "Treasure Hunt" for scrap which aims to "build a bridge between the homes of this country and the yards where materials are sorted, graded, processed, packed and shipped."

John Hulst, Veteran U. S. Steel Engineer, Retires

John Hulst, vice president, United States Steel Corp., New York, retired last week after 40 years' association with the corporation and its subsidiaries.

Veteran of the period of the industry's greatest development, Mr. Hulst was active in U. S. Steel's extensive program of plant modernization. He frequently has been cited as one of the best steel engineering minds in America.

A native Netherlander, he came to America in 1874, attended grade and high schools of Grand Rapids, Mich., graduated in mechanical engineering from the University of Michigan in 1895.

Mr. Hulst entered the steel business as a draftsman with the Ohio Steel Co. in Youngstown, O. In 1900 he went with the South Sharon Steel Co. and in 1901 became chief engineer of Mingo works, National Steel Co. Later in 1901, he returned to Ohio works as chief engineer and occupied this position for 11 years until 1912, when he became chief engineer of Carnegie Steel Co. in Pittsburgh. In 1916 he was appointed assistant to vice president of U. S. Steel Corp. at New York and in 1926 was made vice president.

Mr. Hulst is a member of the Engineers Society of Western Pennsylvania, American Society of Mechanical Engineers and American Iron and Steel Institute.

Total volume of industrial development in the Chicago area in June amounted to $108,708,000 compared with $11,568,000 for June, 1941, according to the industrial department, Chicago Association of Commerce.

Group Classification Certification Still Required on Iron, Steel Orders

INTRODUCTION of Allocation Classification Symbols has not eliminated the necessity of certifying on iron and steel orders that the material is required for a certain group classification, as required by Amendment No. 3 to Order M-21.

WPB has advised that while the group classification notation will be supplanted by the Allocation Classification Symbols, buyers should use both until such time as the latter classifications have filtered down through all industry. Iron and steel producers still are required to submit data to WPB classifying their shipments in accordance with the groups listed in M-21.

Some steel sellers are advising their customers to furnish information under both M-21 and Allocation Classification requirements, pointing out that this arrangement likely will continue until such time as WPB prescribes a report form and establishes a filing date covering Priorities Regulation No. 10 (Allocation Classification System). Possibility is seen of such continuation until July 31, since that date has been fixed for final reporting to suppliers of symbols applying to orders placed prior to June 30 and uncompleted July 31.

The fact that in announcing the Allocation Classification System WPB explained that "it will supersede a variety of use classifications now required under Materials ("m") orders" has created considerable confusion among buyers of nonferrous metals as well as of iron and steel. Aluminum purchasers for some time have been required by Order M-1-f to give detailed information concerning use of material being ordered, and many buyers have assumed such data no longer are required. Actually there has been no revocation of this requirement, however, nor has there been any advice from WPB that it will be.

In the case of copper, Form PD-175 which heretofore accompanied all purchase orders and indicated the part into which the material would be incorporated and its end-use, has been suspended. Hereafter brass mills, wire mills and brass foundries will be required to obtain only Allocation Classification information from their customers.

PRIORITIES—ALLOCATIONS—PRICES

Weekly summary of orders and regulations issued by WPB and OPA, supplementary to Priorities-Allocations-Prices Guide as published in Section II of STEEL, July 6, 1942.

M ORDERS

M-24-a (Amendment): **Iron and Steel Scrap**, effective July 1. Extends regulations covering disposition of tinned and detinned scrap to certain counties of Missouri, Kansas and Texas.

M-63 (Amendment): **Imports of Strategic Materials**, effective July 2. Requires filing of PD-222-C with WPB for authorization to import material whether in bond or otherwise, including importation for transshipment to foreign countries.

M-154: Thermoplastics, effective June 27. Defines sequence in which orders for various purposes are to be filled.

M-158 (Amendment): **Drum Exterior Coatings**, effective June 27. Permits use of coatings manufactured before June 6, 1942. Limits order application to drums of 29 gage or heavier steel.

M-161 (Amendment): **Inventory Restrictions**, effective June 26. Lifts restrictions on paper and paper products, waste paper and ilmenite.

M-166: Flag Fabrics, effective June 27. Assigns A-2 rating to fabric deliveries to flag manufacturers.

M-178: Butadiene, effective July 1. Provides for allocation. PD-33 used by buyers to request delivery.

M-181: Small Diamond Dies, effective July 1. Places dies with diameter of 0.0015-inch or less under complete allocation. Suppliers file PD-559 with WPB by 15th each month, consumers file PD-560 by same date.

P ORDERS

P-41-c: Defense Projects, effective June 26. Assigns A-1-a rating to China National Aviation Corp. for material for war project construction in Far East.

P-89 (Amendment): **Chemical Plants**, effective June 24. Removes restrictions on size of coal and coke inventories of such plants.

P-118 (Amendment): **Dairy Machinery**, effective June 26. Raises assigned ratings to A-1-j for materials for maintenance or repair and A-3 for materials for operation or replacement of dairy equipment.

L ORDERS

L-139: Dental Equipment, effective June 25. Schedule I reduces by about 50% types and sizes of dental excavating burs permitted to be manufactured.

PRIORITIES REGULATIONS

No. 10 (Amendment). Exempts use of Allocation Classification Symbol and Purchaser's Symbol from single purchase orders or contracts totaling $15 or less. Distributors not required to indicate Allocation Classification Symbol on material purchased for resale to retailers, but must use Purchaser's Symbol (DP) on purchase orders.

PRICE SCHEDULES

No. 6 (Amendment) **Iron and Steel Products**, effective June 30. Provides uniform rules for application of extras on cold finished bars and shafting; requires iron and steel producers to file data with OPA covering conversion and processing charges; defines conditions under which discounts on concrete reinforcing bars are to be given.

No. 113 (Amendment)—**Iron Ore**, effective July 2. Excludes exchanges of ore between producers from price regulations, also Minnesota ore mined south of Minneapolis.

No. 136 (Revised)—**Machines and Parts**, effective July 22. Defines specific items for which maximum prices are those in effect Oct. 1, 1941, and those in effect March 31, 1942. Sets March 31 as basing date for machinery services.

MEETINGS

Nelson To Address Automotive Council for War Production

Donald M. Nelson, WPB chairman, will address the first annual meeting of the Automotive Council for War Production, July 10, at the Book-Cadillac hotel, Detroit. His address will climax a one-day meeting which will include visits to war plants in the Detroit and Pontiac areas, a luncheon and business session in the afternoon. Other government and industry executives will speak. Estimates indicate more than 1000 officials of the auto and allied industries will attend.

Tool Engineers

National officers of the American Society of Tool Engineers and chairmen of the New England chapters of the society have started plans for a War Production Conference to be held in Springfield, Mass., Oct. 16-17. Five technical sessions have been scheduled. The conference committee, headed by the past national president, F. W. Curtis, is composed of the chairmen of the seven New England chapters and heads of Northern New Jersey and New York chapters.

Chemical Conference

Chemistry in the solution of wartime problems will be discussed at the second biennial National Industrial Chemical Conference and Exposition in Stevens hotel, Chicago, Nov. 17-22. At a forum, leading authorities will talk on recent discoveries and processes in advancement of applied chemistry. The show this year will be twice as large in floor space as the first exposition. About 75 per cent of the available space is under contract.

Hardware Associations

Forty-eighth annual convention of the National Wholesale Hardware Association and the American Hardware Manufacturers Association will be held in Palmer House, Chicago, Oct. 19-21. A number of addresses by officials of the War Production Board and OPA are scheduled.

WINDOWS of WASHINGTON

By L. M. LAMM *Washington Editor, STEEL*

Automotive industry increases war materials shipments 46 per cent in two months. Conversion has been rapid . . . Uses of tin and terne plate further restricted . . . Advisory committee on lake shipping named

WASHINGTON

WAR shipments by the automotive industry were 46 per cent greater in April than in February.

This report on the progress of conversion of the vast industry to war work is based on reports from 432 plants of 157 companies, which, on the basis of labor employed make up 72 per cent of the industry.

Compiled by WPB's Automotive branch, the report covers eight large automotive manufacturers, nine truck companies and 140 parts companies.

These companies reported April shipments of $420,000,000, of which 83 per cent were war goods. War shipments increased from $239,000,000 in February to $349,000,000 in April, while non-war shipments declined from $145,000,000 to $72,000,000.

Value added of war products increased 53 per cent. Value added represents the difference between the money value of shipments and the cost of materials and parts supplied. These 432 plants had a total value added on war work in April of $188,000,000, compared with $123,000,000 in February.

Thus the April shipments of war goods from these companies, 72 per cent of the industry, was at an annual rate of more than four billion dollars, while the value added was at the rate of 2¼ billion dollars a year.

Some shipments from parts companies may have gone to automobile manufacturers or truck companies and the figures on total shipments, therefore, would include some duplications. Value added includes no duplications.

In the eight automobile manufacturing companies, value added on war goods increased 87 per cent, from $54,000,000 to $102,000,000. War shipments increased 64 per cent, from $113,000,000 to $186,000,000. Companies included General Motors, Ford, Chrysler, Studebaker, Hudson, Packard, Nash and Graham-Paige, which operate 182 plants.

Man hours on war work in the group increased from 17,000,000 in February to 47,000,000 in April, or 160 per cent.

"Although 30,000,000 man hours were added in April over February, preparation for war work is not included in the April man-hour figures and a substantial additional quantity would be noted, if these figures were available," Ernest Kanzler, Chief of the WPB Automotive Branch, reported.

In the 432 plants, which employed 561,480 persons in April, man hours increased from 65,000,000 in February to 104,000,000 in April. Of the 39,000,000 increase, 36,000,000 of it was on war work, which went from 39,000,000 man hours in February to 75,000,000 in April. Thus man hours on war work were 92 per cent greater in April than in February and war work comprised 72 per cent of the total man hours in these 432 plants.

It has been estimated that when these plants reach their maximum war production, the total man hours will be 1,350,000,000 a year. The 75,000,000 man hours on war work in April was at an annual rate of 900,000,000, or two-thirds of the way toward the war man power peak.

Advisory Committee for Great Lakes Transportation Appointed

Formation of an advisory committee on Great Lakes transportation was announced last week by Joseph B. Eastman, director of defense transportation. The committee will act as an advisory body to A. T. Wood, director of ODT's division of Great Lakes carriers.

Members are:

A. H. Ferbert, president, Pittsburgh Steamship Co., Cleveland; Sparkman D. Foster, Foster, Yost & Lott, Detroit; E. B. Greene, president, Cleveland-Cliffs Iron Co., Cleveland; Elton Hoyt II, president, Interlake Steamship Co., Cleveland; George M. Humphrey, president, M. A. Hanna Co., Cleveland; Wm. A. Reiss, president, Reiss Steamship Co., Sheboygan, Wis.

Exempt Trading of Iron Ore by Producers from Price Regulation

Trading or exchanging of iron ore between producers has been excepted from the price provisions of Maximum Price Regulation No. 113, which covers iron ore produced in Minnesota, Wisconsin and Michigan by OPA.

Excluding of these transactions from price provisions is one of seven changes in Regulation No. 113 made by Amendment No. 1 to the Regulation, which become effective July 2.

Amendment No. 1 affects the following:

1—Excludes exchanges or trades of ore from the regulation, but requires, however, the submission of reports on certain types of exchanges or trades.

2—Provides for the deduction of allowances for shrinkage, insurance and analysis.

3—Clarifies the provision relating to escalator clauses in long-term contracts.

4—Places sellers under long-term contracts for delivery at the mine or at upper lake ports on the same basis as other sellers with respect to freight absorption.

5—Clarifies the provision covering new sellers to include sellers of classifications or grades of ore not sold in 1941.

6—Excludes from the regulation ore mined in Minnesota south of Minneapolis.

7—Establishes Granite City, Ill., as in effect a new alternating basing point.

H. W. Dunbar Resigns as WPB Tools Section Executive

H. W. Dunbar, who has been assistant chief of the Tools Branch, WPB Production Division, has resigned effective July 1 and has left Washington. He will return to the Norton Co., Worcester, Mass. Mr. Dunbar is being succeeded by B. H. Bickle of the Gleason Works, Rochester, N. Y., and A. M. Steadfast, of Steadfast & Roulston, Boston.

Uses of Tin, Terne Plate Are Further Curtailed

Manufacture or use of tin plate or terne plate cans for many chemicals, paints, and other "special products" has been prohibited in a revision of Conservation Order M-81.

Among the special products for which tin plate or terne plate cans are not permitted are the following:

All paint and related products. (An exception is made in the case of shellac, lacquers, varnish removers, lacquer thinners, and lacquer stains, which may use terne plate, but not tin plate cans.)

Health supplies (except chloroform, ether, and blood plasma for the armed services or the Red Cross.)

Alcohol; cements, including rubber, linoleum, and radiator; fly spray; lighter fluids; acetone; amyl acetate; oleic acid; sodium silicate; dry cleaners; turpentine; phenols and benzols; and glycerine.

Dyes; graphite; liquid soap; glues

THE NEW DETROIT

Tap Reconditioner

1. CHAMFERS R. & L. H. TAPS
2. SPIRAL POINTS
3. POLISHES SPIRAL POINTS

The new Detroit Tap Reconditioner has been developed to meet the need for conservation of tools under the War Production Program by decreasing tap consumption, decreasing tapping costs through increasing the output per tap during its useful life and providing an efficient low-cost method of accurately reconditioning taps.

Bulletin TR-1, describing the Detroit Tap Reconditioner is available on request.

Write for your handy Wall Chart—"Recommended Angles for Reconditioning Taps".

DETROIT TAP & TOOL Company 8432 BUTLER DETROIT

and paste; waxes; and polish.

The revision also prohibits the packing of the following products in tin plate or terne plate after Oct. 31: Hardened edible oils; hardened or unhardened lard; edible liquid oils; fish fillets; crab meat; and shrimp.

Restriction on Use of Chrome Chemicals Eased

Restrictions on the use of chrome chemicals, particularly in the manufacture of pigments and printing inks, have been eased by WPB.

Revisions were made in Orders M-18-b, covering various uses of chrome chemicals, and M-53, which relates to the use of chrome pigments in printing inks.

The orders cover chrome chemicals only and have no bearing on metallurgical or refractory grades of chromium. Approximately 12 per cent of the total chromium supply is used for chemicals, of grades not adaptable for other uses.

M-18-b lifts the restriction on the manufacture of chrome pigments from 90 per cent of the base period, the year ending June 30, 1941, to 100 per cent. Use of chrome chemicals in the manufacture of ceramics, soap and glass, heretofore prohibited, is limited to 100 per cent of the base period. In roofing materials, also prohibited by the original order, 50 per cent of the base period use may be consumed. For leather tanning the restriction is from 90 to 100 per cent.

M-53 permits the use of chrome pigments in printing inks of 100 per cent of the amount used in 1941, instead of 70 per cent and makes other technical changes in the order.

New Shifts in War Board Organization Projected

Details of a major division of activities among WPB and other war agencies are reported to have been laid before Donald M. Nelson.

W. H. Harrison, who as chief of the WPB Production Division has primarily been concerned with development of materials-producing facilities, is slated, according to good authority, to join General Brehon Somerville's Services of Supply organization now being established in the War Department. Mr. Harrison will receive the rank of Brigadier General, for which his nomination is pending. He now holds the rank of colonel.

This change is in line with the Nelson policy that as creation of new production facilities for materials declines, and the problem becomes one of production itself, the functions belong to the other agencies concerned. The recent order virtually terminating new materials-producing facilities, in favor of utilizing available materials themselves for additional war production, made it advisable for Col. Harrison to give more attention to war procurement.

This policy may extend to other WPB activities. Meanwhile, it is reliably expected that the Army and Navy Munitions Board will be transferred bodily to the WPB organization. The British American Joint Resources and Production group will be placed directly under James S. Knowlson, now directing WPB Industry Operations.

There is a projected consolidation of the Materials Division and the Division of Industry Operations, under a WPB head not yet formally designated; likewise a consolidation of several other old WPB divisions is likely. The fate of the Division of Civilian Supply in these changes is not yet clear.

The Iron and Steel Branch, along with other older divisions of WPB, will remain intact. Actual changes still to be made, it is said, are known only to Mr. Nelson and his immediate advisers at this stage, and probably will not become known until definitely decided upon by him.

WPB Determining Amounts of Metals, Ratings To Be Allowed Under PRP

MORE than 11,000 third quarter applications under the Production Requirements Plan have been received by WPB. Most large users of metals are believed to have met the July 1 deadline.

Facilities have been set up in the Production Requirements Branch and in the industry branches of the WPB to handle the PRP applications, and companies will be notified within a reasonable length of time of the quantities of materials they will be authorized to receive during the third quarter, and the ratings which they may apply to their orders.

To take care of cases in which the approved PRP certificates were not returned to the applicant by July 1, an interim procedure was set up under the terms of Priorities Regulation No. 11. Companies which have properly filed a PRP application before the deadline, may continue to use or extend ratings previously assigned to them, until they receive their PRP certificates. However, they may not receive in this way more than 40 per cent of their estimated requirements of any material for the whole of the third quarter, and any materials so received must be deducted from the amount authorized on their third quarter PRP certificate.

Amounts and quantities of materials authorized under the PRP for the third quarter, and the level of ratings for industries and individual companies, are being determined in accordance with broad policies established by the Requirements Committee of WPB, assisted by the Army and Navy Munitions Board, and the various industry branches. The ratings assigned to any particular company, and the quantity of materials which will be authorized, are dependent in part upon the volume and type of war orders which the company is working on, and also upon the importance of the company's product in the war economy, regardless of previously issued preference ratings.

Mr. Knowlson explained that the third quarter program under PRP is necessarily a stage of transition from primary emphasis on the level of preference ratings to a quantitative control of material for which ratings may be used. The procedures currently employed will inevitably be modified in the light of experience when the fourth quarter program is prepared.

Differential in Ratings

However, in processing third quarter applications it is the intention of WPB to keep the total amount of scarce materials for which preference ratings are authorized within the limits of the estimated supply, and it is therefore hoped that, in most cases, the ratings assigned to particular companies will be high enough to enable them to obtain the materials which they are authorized to receive during the quarter. It is, of course, necessary to maintain a differential in preference ratings so that vital war industries and indispensable civilian producers may be assured of filling their materials requirements if the total supply should prove insufficient to cover all rated orders during the quarter.

Use of the recently announced Allocation Classification symbols (STEEL, June 22, p. 52-A) on purchase orders and reports to WPB will provide additional information as to end uses of a manufacturer's products for consideration in making materials authorizations under PRP for the fourth quarter.

Charles M. Schoenlaub, who has been acting chief of the Production Requirements Branch, has been made chief of the branch.

War Orders To Be Rerated To Permit More Flexibility in Priority System

WASHINGTON

PROVISION for rerating war orders and for applying a new series of high preference ratings has been made in Priorities Regulation No. 12, just issued, and in amendments to Priorities Regulations Nos. 1 and 3.

The new ratings are AAA, AA-1, AA-2, etc., all of which will take preference over A-1-a ratings. Heretofore the highest rating has been AA, use of which was permitted only by special authorization of the Director of Industry Operations. This rating is now abolished, and all outstanding AA ratings are automatically changed to AA-2.

Chief purpose of the rerating is to permit greater flexibility in the assignment of preference ratings to definite quantities of military and related nonmilitary items, most of which have recently been either AA or in the A-1 series. It will permit use of the top ratings for a balanced program of urgent war materials without seriously disturbing the pattern of ratings for other war and essential civilian orders.

The new high ratings may be assigned either directly by the Director of Industry Operations or by appropriate officers of government war agencies expressly authorized to issue reratings. A special form, PD-4X, called a "Rerating Direction," is prescribed for use where the Army, Navy or other government war agency rerates deliveries of war materials to be made directly to it.

Whenever a rerating direction is issued, it must include the Allocation Classification and Purchasers' Symbols required by Priorities Regulation No. 10.

A separate form called a "Rerating Certificate," PD-4Y, is provided for use by a manufacturer whose deliveries to a war agency have been rerated, so that he may in turn rerate related deliveries to be made to him. The test for determining what deliveries may thus be rerated by a manufacturer or his suppliers is substantially the same as the test for determining to what deliveries an original rating may be applied or extended, as specified in Priorities Regulation No. 3, which was recently amended to provide a uniform standard in this respect.

Reratings May Be Extended

A manufacturer may apply or extend the rerating to material which will be delivered by him on a rerated order, or physically incorporated in material so delivered, or to restore inventories to a practicable working minimum when material has been taken from inventory to fill a rerated order.

The new ratings may also be used by small companies for certain operating supplies which will be consumed in filling the rated order, up to 10 per cent of the cost of materials to be processed, provided that not more than 25 per cent of such operating supplies are metals in the forms listed in Priorities Regulation No. 11. Such reratings may not be used to obtain operating supplies by any company whose use of the metals listed in Regulation 11 amounts to more than $5000 in a quarter.

PRP No Barrier

Companies operating under the PRP are specifically authorized, like other companies, to apply or extend the higher ratings, to rerate deliveries to themselves, but may not use the ratings to obtain greater quantities of material than they are authorized to receive on their PRP Certificates (Form PD-25A) or a supplementary certificate issued upon application on Form PD-25F or PD-25H.

Priorities Regulation No. 1 has been amended by altering the provision with respect to displacement of rated orders by new orders bearing a higher rating. Previously, no producer was required to divert material already processed to fill an order rated A-10 or higher which was within 15 days of completion, even when he received a new order with a higher rating, unless the new rating was AA. Hereafter, this provision applies only in case the rating on the original order was higher than A-2. Such an order within 15 days of completion must be displaced only by a new order with an AAA rating, or by specific direction from the WPB.

In no case, however, is a company required to terminate existing production schedules in less than 15 days after receipt of a new rated order, and a company may continue on its existing production schedule up to a maximum of 40 days if change is impracticable, unless specifically instructed to change the schedule by the Director of Industry Operations.

Priorities Regulation No. 3 is amended to conform to the provisions of Regulation 12, and the amendments to Regulation 1. The amendment to Regulation 3 also modifies the previous provision with respect to simultaneous extension of several different ratings. Whereas previously a company having several different ratings to be extended to orders for the same material could put them all together and write one purchase order for the entire quantity, using the lowest rating for all of it, this will now be permitted only when it is not commercially practicable to rate and obtain the items separately.

WASHINGTON TODAY: Capital of the Four Freedoms greeted 14 heroes of World War II recently, and the photographer caught this interesting picture, as they paraded past the capitol building. The visitors were greeted at the White House by President Roosevelt and the British ambassador, Lord Halifax, and then received by members of Congress. NEA photo

Bureau of Mines Reorganized To Accelerate Domestic Mineral Output

WASHINGTON

REORGANIZATION of the Bureau of Mines to help increase domestic production of strategic and critical minerals for the war program was announced last week by Dr. R. R. Sayers, director. "Streamlining" will be designed to increase output of ores, enlarge production of processed minerals and obtain greater use of substitute metals for those which the United States lacks.

"To win this war we must get more American metals and other minerals out of the ground and into the nation's factories to produce ships, tanks, trucks, planes, guns and other weapons," said Secretary of the Interior Harold L. Ickes who directed the reorganization.

The bureau has worked out and tested a large number of metallurgical methods and processes which should be used to provide much needed war materials at once, Mr. Ickes explained. He expects the changes will accelerate the movement of processes from the laboratory and pilot-house stage to commercial production.

Sponge Iron Again

"I am asking the bureau to help remove the bottleneck in steel for cargo ships and tanks and guns by bringing sponge iron plants to make up for the shortage of scrap iron and steel (Steel, June 29, p. 44). We have got to lick the job of getting more aluminum for planes from America's low-grade bauxites and clay. We have got to supply more tungsten for our high-speed steel tools by producing every pound of that vital metal from small, low-grade deposits scattered throughout the West.

"We must provide sufficient chrome from our low-grade domestic ores to provide tough armor plate for the warships we are building. We must build up our production of ferromanganese to keep the steel mills running, and produce more electrolytic manganese as a substitute for nickel.

"We must step up production of magnesium, and develop newer and better ways of producing magnesium for planes and motors and incendiary bombs."

The bureau reorganization includes the establishment of three regional offices which will operate under the supervision of Dr. R. S. Dean, assistant director. These offices will be located at Salt Lake City, Utah, for the western states; Rolla, Mo., for central states; and College Park Md., for eastern and southern states. Each office will be headed by a regional engineer and an assistant regional engineer, whose functions will be to supervise, initiate and execute investigations approved by the office of the director leading to the more rapid use of mineral resources in the region under their supervision.

The regional engineers will supervise the operation of the bureau experiment stations in their respective regions and will direct laboratory investigations, as well as prepare such analysis and reports as will speed the production of minerals needed for the war. Under the jurisdiction of the regional engineers will be district engineers to states or districts within the regions.

The regional engineers also will have project engineers and other technologists and scientists.

Regional engineers will take over all the functions and duties in the field previously assigned to the Mining, Metallurgical and Nonmetals divisions of the Technologic Branch which are now abolished. To advise the office of the director and to perform fact-finding functions and handle reports from the regional engineers, a Resources and Laboratories Service, containing a Mineral Processes Division, a Mining Division and a Laboratories Planning Division, has been established with a small staff in Washington.

The reorganization order also provides for the establishment of a Fuel and Explosives Service within the bureau, which will take over the Coal Division, the Petroleum and Natural Gas Division and the Explosives Division, all of which were part of the abolished Technologic Branch. Operation of the helium plant at Amarillo, Tex., will be under the jurisdiction of the Petroleum and Natural Gas Division, as formerly. All laboratories working exclusively on petroleum or exclusively on coal will also operate under the Chief of the Fuels and Explosives Service, as will sections of other laboratories devoted to petroleum, gas or coal. All other laboratories are transferred to the appropriate regional offices.

Another change in organization is the abolition of the Administrative Branch and position of assistant to the director and the establishment of the position of administrative assistant. Editorial, information, industrial motion picture and graphic functions of the Bureau also are consolidated by the order.

Stephen M. Shelton, a bureau metallurgist and an authority on the recovery and processing of manganese and other ores, has been appointed regional engineer for the southern and eastern states under the new program, Dr. Sayers announced. Mr. Shelton played an important part in the origin and development of the electrolytic manganese process while doing research work at Reno, Nev.

Tungsten Placed Under Tighter Control by WPB

Tungsten, essential ingredient of hardened steels critically needed in war production and armament, has been placed under further allocation and end-use control by an amendment to General Preference Order M-29.

While tungsten is urgently needed for alloy steel, the small amount needed for electric light bulbs will not be affected by this amendment, though allocation control in the original order still applies.

The principal effect of the new amendment is to place under complete allocation and end-use control all tungsten ores and concentrates.

The amount of contained tungsten which may be delivered to any one person in any one month without restriction is reduced from the 100 pounds allowed in the original order to a new maximum of 25 pounds.

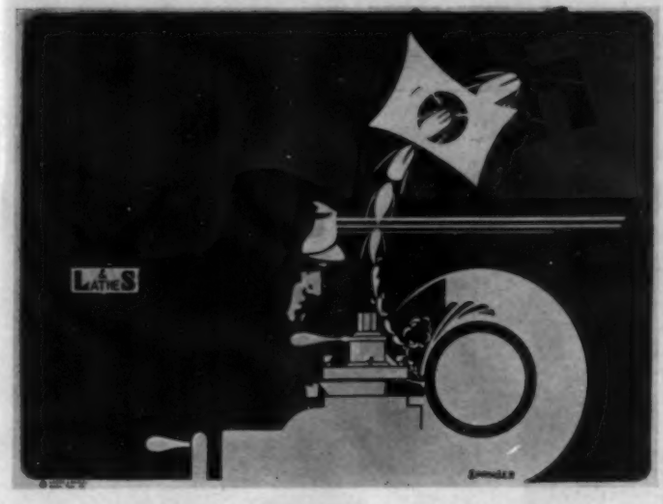
Definition of "tungsten"—the material covered by the order—is broadened to include any substance whatever containing recognizable tungsten, in any stage of process, except alloy steel, high speed steel, tool steel, and finished tools.

To encourage production of concentrates, the amendment allows delivery without restriction of ores or concentrates containing less than 20 per cent tungsten to processors for concentration, or dealers, though no dealer may hold such stocks longer than 60 days.

Persons desiring allocations of tungsten must apply for it on Form PD-9-c before the 20th of the month preceding delivery, sending copies to WPB and to the supplier. Form PD-9-d covering inventory, and proposed production must accompany PD-9-c.

MRC Increases Quantity, Price of Bolivian Tin

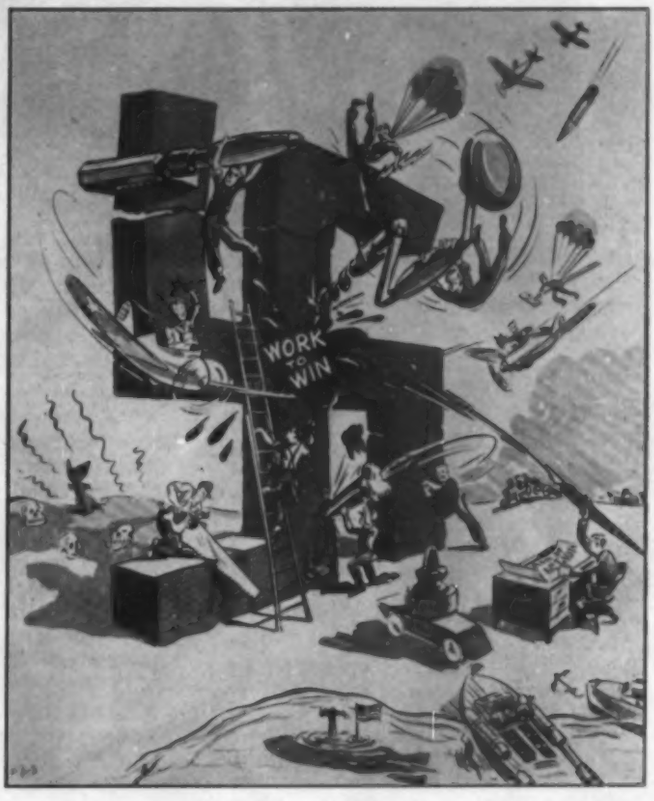
Agreement between Metals Reserve Co. and Bolivian tin producers, increasing the quantity of tin ores and concentrates which may be delivered to MRC during the period ending June 30, 1943, and increasing the price of the tin content of the material delivered during that period to 60c per pound f.o.b. Chilean and Peruvian ports, has been announced by Jesse Jones, Secretary of Commerce.



Flying Chips from the Lathe Will Defeat the Axis

We Have the Ol' Batting Eye Now

America's New Frankenstein Goes Into Action



Demolition Squad

Plant Cartoons Emphasize Importance of Production

CARTOONS relating the industrial production effort to defeat of the enemy, often drawn by employes and inspired by labor-management or other drives, now appear in many war plants.

"Flying Chips from the Lathe Will Defeat the Axis" is the work of Fred Springer, an employe of Lodge & Shipley Machine Tool Co., lathe builders in Cincinnati, now engaged in all-out war production. Springer is an artist turned toolmaker for the duration. His poster is displayed throughout the Lodge & Shipley shops.

"We Have the Ol' Batting Eye Now" was drawn for Hobart Bros., Troy, O., to depict the increased production of welding equipment and other materials essential to the war program.

"America's New Frankenstein Goes Into Action" appears in the current edition of Allis-Chalmers Mfg. Co.'s house organ, *Victory Production News.*

"Demolition Squad" is the creation of William Solms, junior draftsman at the Packard Motor Car Co., Detroit, and was submitted in a company-sponsored "Work-To-Win" production drive. The artist won a merit award for his work, the excellence of which can be judged by close scrutiny of details. Note particularly on the desert at the left the drying skulls of Mussolini, Hitler and Hirohito. Other Packard employes won awards for slogans and poems on the same theme, all part of the program to stimulate production which was mapped out by George T. Christopher, president.

Another All-Out Idea

ST. LOUIS

In a letter to a dealer, prominent in the recent drive for scrap iron and steel, Convict No. 9532, State Penitentiary, Jefferson City, Mo., serving a lengthy term for forcible entry with a jimmy, makes a patriotic suggestion.

No. 9532 believes that many tanks, bombs and submarines could be built with steel from bars, gates and cells of the Jefferson City and other state and federal prisons.

MEN of INDUSTRY

R. J. Schuler

K. J. Pedersen

W. B. Griese

R. J. SCHULER has been appointed general manager, Hampshire Products Inc., Milan, Mich. He resigned July 1 as assistant manager of sales, Bolt & Nut Division, Republic Steel Corp., Cleveland. Prior to joining Republic he was manager of sales, LaSalle Steel Co., Chicago.

♦

M. A. Thompson, identified with the Heavy Chemical Sales Division of Pennsylvania Salt Mfg. Co. in the Detroit area since March, 1938, has been transferred to the Industrial Cleaner Division.

♦

S. E. Lauer, president, York Ice Machinery Corp., York, Pa., has been elected a director, American Management Association, New York, to serve a three-year term.

♦

Irving Herriott, general counsel, Zenith Radio Corp., Chicago, has been elected a director to fill a vacancy created by death of Paul Klugh.

♦

J. J. Clark, manager of the Cleveland branch, International Harvester Co., has been named manager of the Toledo, O., branch, succeeding **Le Monte Daniels,** who retired recently.

♦

R. A. Becker has been appointed manager, Baltimore branch, Gar Wood Industries Inc., Detroit. He succeeds **R. J. Grow,** who has joined the Army as a first lieutenant.

♦

Joseph Sander has been promoted to general freight agent, and **John E. Capps** and **Eldon A. Tharp** to assistant freight traffic managers, Rock Island Lines, Chicago.

♦

Harry M. Ellsworth, advertising manager, Pennsylvania Salt Mfg. Co., Philadelphia, has been elected vice president, Eastern Industrial Advertisers Association for the 1942-43 term. Mr. Ellsworth also serves as chairman, employment section, eastern district, National Industrial Advertisers Association.

♦

K. J. Pedersen has been transferred to Charlotte, N. C., to handle sales in North and South Carolina for Acme Steel Co., Chicago. Associated with Acme 20 years, he will maintain headquarters at 2243 Selwyn avenue.

G. R. Easley, on leave from his Acme duties in South Carolina, is now in the Army in training to become an officer.

♦

Benjamin Sack, heretofore executive vice president, Aircraft Screw Products Co. Inc., Long Island City, N. Y., has been elected president, to fill a vacancy which was created in August, 1941.

♦

Philip F. Smith, secretary, Osborn Mfg. Co., Cleveland, has accepted an appointment as a senior priority specialist, Special Industrial Machinery Branch, War Production Board, Washington, for the duration of the war.

♦

Lynn A. Williams Jr., secretary and head of the legal department, Stewart-Warner Corp., Chicago, has been elected a vice president. Associated with the company nine years, he will continue his former duties.

♦

R. E. Lawlor, manager of sales in the Detroit district for Otis Steel Co. for seven years and widely known throughout the automotive and motor parts industries, has resigned. He will announce a new affiliation at an early date. Otis Steel sales offices are being consolidated with those of Jones & Laughlin Steel Corp., which has purchased assets of the Cleveland company.

♦

William B. Griese, plant manager, Lycoming Division, Aviation Corp., Williamsport, Pa., has been made plant manager of the company's new Liquid Cooled Engine Division, plant for which is now under construction in Ohio. He will be succeeded at Lycoming by **M. I. Bradley,** works manager. Mr. Griese became associated with Aviation Corp. in February, 1941, and for 17 years before that was with Crosley Corp., Cindent, has been elected a director, reperintendent.

♦

Claud Wampler, executive vice president, Carrier Corp., Syracuse, N. Y., has been elected president, succeeding the late J. Irvine Lyle. **Edward T. Murphy,** senior vice president, has been electetd a director, replacing Mr. Lyle.

♦

John Nuveen Jr., since 1919 a member of the municipal bond firm of John Nuveen & Co., Chicago, has been appointed Chicago regional salvage manager, Bureau of Industrial Conservation. He will direct activities of the four sections of the bureau, general salvage, industrial salvage, automobile graveyards and special projects.

♦

J. P. Margeson Jr. and **Franklin Farley** have been elected vice presidents, International Minerals & Chemical Corp., Chicago. Mr. Margeson, who has been general manager of the magnesium division, also will become general manager

of the potash division. Mr. Farley has been general manager of the phosphate division. **John T. Burrows** has resigned as vice president and will devote full time to executive direction, Phosphate Recovery Corp., a subsidiary owned jointly with Minerals Separation North American Corp.

Additional Advisory Committees Appointed

Additional industry advisory committees appointed last week by T. Spencer Shore, chief of the Bureau of Industry Advisory Committees, include the following in the metalworking field:

Fin Coils, Coolers

A. H. Baer, Air Conditioning and Commercial Refrigeration Branch, government presiding officer.

Committee members: R. C. Colman, McQuay Inc. Minneapolis; Morrill Dunn, McCord Radiator & Mfg. Co. Detroit; J. W. Hatch, Bush Mfg. Co., Hartford, Conn.; B. E. James, York Ice Machinery Corp., York, Pa.; H. T. Jarvis, Refrigeration Engineering Inc., Los Angeles; O. Z. Klopsch, Wolverine Tube Division, Calumet & Hecla Consolidated Copper Co., Detroit; William L. Lynch, Rome-Turney Radiator Co., Rome, N. Y.; Milnor Noble, Aerofin Corp., Syracuse, N. Y.; Paul H. Schoepflin, Niagara Blower Co., New York; O. E. Sims, Larkin Coils Inc., Atlanta, Ga.; Reuben Trane, The Trane Co., LaCrosse, Wis.; E. R. Walker, Fedders Mfg. Co., Buffalo.

Heat Exchangers

William K. Frank, chief, Resources Protection Board, government presiding officer.

Committee members: W. C. Beekley, Whitlock Mfg. Co., Hartford, Conn.; H. M. Corrough, Alco Products Division, American Locomotive Co., New York; G. H. Cox, Westinghouse Electric & Mfg. Co., South Philadelphia, Pa.; J. A. Coy, J. A. Coy Co., Tulsa, Okla.; Chas. Currier, Ross Heater & Mfg. Division, American Radiator & Standard Sanitary Co., Buffalo; E. L. Durrell, J. B. Beaird Co., Shreveport, La.; C. H. Latrial, Southwestern Engineering Co., Los Angeles; Melvin Sack, Henry Vogt Machine Co., Louisville, Ky.

Livestock Equipment Manufacturers

William R. Tracy, chief, Farm Machinery and Equipment Branch, government presiding officer.

Committee members: Ben H. Anderson, Ben H. Anderson Mfg. Co., Madison, Wis.; L. J. Brower, Brower Mfg. Co., Quincy, Ill.; C. E. Butler, The Galloway Co. Inc., Waterloo, Iowa; J. B. Clay, Clay Equipment Corp., Cedar Falls, Iowa; Zur W. Craine, Craine Inc., Norwich, N. Y.; A. R. Hill, The Buckeye Incubator Co., Springfield, O.; R. C. Hudson, H. D. Hudson Mfg. Co., Chicago; H. B. Megran, Starline Inc., Harvard, Ill.; T. W. Merritt, Babson Bros. Co., Chicago; S. H. Smith, The Smith Incubator Corp., Bucyrus, O.; George C. Stoddard, DeLaval Separator Co., New York; W. A. Zaloudek, Oakes Mfg. Co., Tipton, Ind.

Zinc Producers

George C. Heikes, chief, Zinc Branch, government presiding officer.

Committee members: Kenneth C. Brownell, American Smelting & Refining Co., New York; Frank E. Chesney, American Steel & Wire Co., Cleveland; Irwin H. Cornell, St. Joseph Lead Co., New York; Robert E. Dwyer, Anaconda Copper Mining Co., New York; George W. Potter, Eagle Picher Mining & Smelting Co., Joplin, Mo.; Howard I. Young, American Zinc Lead & Smelting Co., St. Louis; Benno Elkan, International Minerals & Metals Corp., New York; Marshall L. Havey, The New Jersey Zinc Co., New York; C. H. Klaustermeyer, Metals & Ore Division, Grasselli Chemical Division, E. I. du Pont de Nemours & Co., Wilmington, Del.; J. M. Pomeroy, General Smelting Co., Philadelphia; Bernard N. Zimmer, American Metal Co., New York.

Power Cranes, Shovels

Joseph F. Ryan, chief, Construction Machinery Branch, government presiding officer.

Committee members: C. B. Smythe, Thew Shovel Mfg. Co., Lorain, O.; Carlton R. Dodge, Northwest Engineering, Chicago; Morgan Ramsay, Bay City Shovels, Bay City, Mich.; Doc Shelton, Marion Steam Shovel Co., Marion, O.; Ray Dorward, Insley Mfg. Co., Indianapolis; John Jay, Quickway Truck Shovel, Denver; E. W. Botten, Owen Bucket, Cleveland.

Domestic Water Systems & Irrigation Pumps

William R. Tracy, chief, Farm Machinery and Equipment Branch, government presiding officer.

Committee members: E. F. Brown, Snow Irrigation Supply Co., Los Angeles; W. M. Bryant, Bryant Pump Co., Hutchinson, Kan.; G. R. Deming, The Deming Co., Salem, O.; E. E. Eickmeyer, Dayton Pump & Mfg. Co., Dayton, O.; R. L. Harner, Everite Pump & Mfg. Co. Inc., Lancaster, Pa.; Robert Hula, Clayton Mark & Co., Evanston, Ill.; Donald C. McKenna, Pomona Pump Co., Pomona, Calif.; R. Lewis, Fairbanks, Morse & Co., Chicago; Henry F. Miller, Goulds Pumps Inc., Seneca Falls, N. Y.; John C. Myers, The F. E. Myers & Bro. Co., Ashland, O.; David V. Steward, Columbiana Pump Co., Columbiana, O.; B. N. Sweeney, Stamm-Scheele Inc., Rayne, La.

Rust Awarded $1,000,000 Equipment Contracts

Rust Furnace Co., Pittsburgh, has been awarded the following contracts, at a total cost in excess of $1,000,000;

For Carnegie-Illinois Steel Corp., Pittsburgh, two large slab heating furnaces for the new plate mill at Homestead, Pa. This contract was awarded by Mesta Machine Co., Pittsburgh. Also for Carnegie-Illinois, five car bottom furnaces at another Pennsylvania location. For Columbia Steel Co., three large heating furnaces, to be installed in Utah. For Caine Steel Co., Chicago, three forging furnaces, to be installed in Tennessee.

Second Double Launching By Federal in Eight Days

Federal Shipbuilding & Dry Dock Co., Kearny, N. J., United States Steel Corp. subsidiary, made its second double launching within eight days June 26. The cargo ships SANTA CECILIA and SANTA MARGARITA went down the ways at that time. Two destroyers were launched June 21 and a cargo ship the previous week.

The two ships in the latest launching were designed before the war for trade with South America. They were built for the Maritime Commission.

DIED:

Philip D. Block, 71, former president and at the time of his death chairman of the executive committee, Inland Steel Co., Chicago, in that city, June 30.

Mr. Block was the last surviving founder of Inland Steel, organized 49 years ago. He had been a principal factor with his father, Joseph Block, and the late George H. Jones, in its organization.

On Nov. 10, 1893, he was elected director and treasurer of the company. In January, 1894, he became treasurer and purchasing agent, and on July 9, 1901, vice president and

Philip D. Block

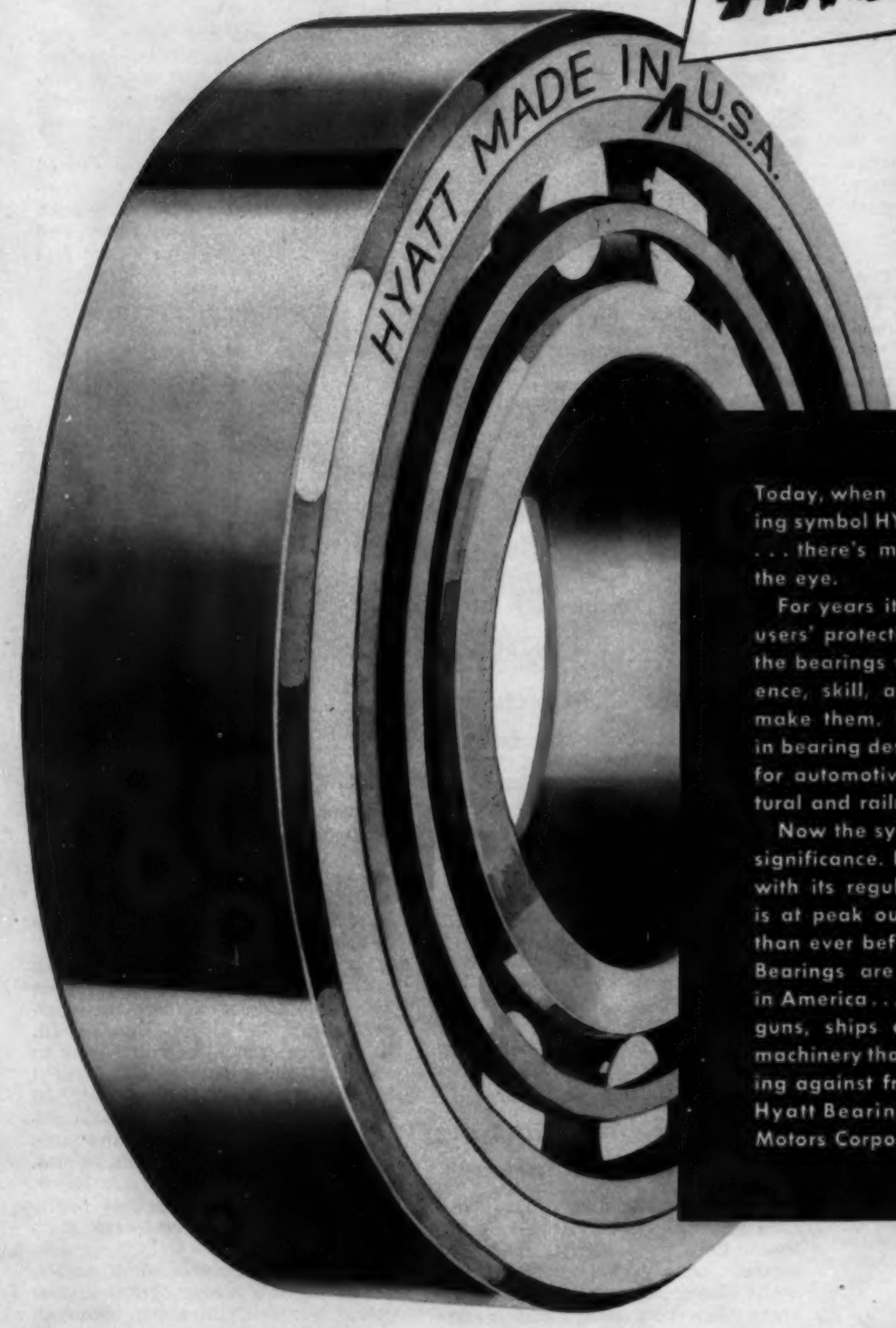
treasurer. Eight years later Mr. Block was elected first vice president. In 1919 he became the fifth president of Inland, a position he held until April 30, 1941. At the age of three score and ten he then retired to the less arduous duties of chairman of the executive committee.

For half a century Mr. Block was "the cornerstone of Inland." He made an efficient plant of the original works at Chicago Heights, Ill. In 1901 he was the main factor in starting the company's principal plant at Indiana Harbor, Ind. In difficult years that followed, he virtually lived with the men and mills at this plant. Through his efforts, assisted by his brother, L. E. Block, Inland rose from a modest beginning to one of the great steel companies of today.

He was a director of the First National Bank, Chicago, but had few other business interests, although serving his industry many years on committees of the American Iron and Steel Institute.

Harry S. Meland, 48, a superintendent of construction, Austin Co., Chicago, drowned June 25 when his motorboat capsized in Silver Lake near Kenosha, Wis.

AND FOR



Today, when you look at the bearing symbol HYATT MADE IN U.S.A. . . . there's more to it than meets the eye.

For years it has represented the users' protection, a guaranty that the bearings were as good as science, skill, and experience could make them. It identified the best in bearing design and performance for automotive, industrial, agricultural and railroad applications.

Now the symbol takes on added significance. It indicates that Hyatt, with its regular and wartime job, is at peak output, harder at work than ever before; that Hyatt Roller Bearings are serving everywhere in America . . . in the vitals of tanks, guns, ships and planes and the machinery that makes them . . . fighting against friction *and for* U. S. A. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

THE 50TH YEAR OF

HYATT ROLLER BEARINGS

By A. H. ALLEN *Detroit Editor, STEEL*

MIRRORS of MOTORDOM

DETROIT

Rubber situation clarified. Crude supply largely cut off by Japanese conquests. Synthetic production to reach large proportions within three years. Butadiene process holds best hopes

HOW do we stand on rubber? Out of a welter of conflicting statements and confusing statistics has emerged some clarifying factual information which, boiled down to its essence, leaves the situation approximately as follows:

Natural Rubber: From the Far East has come 97 per cent of this country's crude rubber supply, imports averaging about 800,000 tons annually for the past three years. Bulk of this is now shut off by Japanese conquests, although some still is being shipped in from Ceylon and India. This year imports are expected to reach 368,500 tons, next year 182,350 tons, providing occupation of further territory by the enemy is forestalled.

Natural rubber from such sources as South America, Africa, the guayule shrub, etc., is of insignificant proportions. Even at $3 a pound, the prevailing price in 1910-12, imports from South America would fall far short of actual needs. Scarcity of labor, inaccessibility of trees, leaf disease and other factors rule out consideration of South America.

Plantations of the Far East have maximum capacity for supplying 1,600,000 tons of sheet rubber, a valuable prize for the Japanese which they conquered virtually intact. It is inconceivable the Japs could have any need for the enormous capacity available, leading some observers to the conclusion they will try to dispose of part of it in world markets. However, as long as they feel they are crippling the U. S. war machine by hanging onto rubber, it may be unlikely they will permit any exports.

Open to Destruction

An interesting angle is that expert studies have indicated a single airplane in the space of two weeks could destroy the entire Far East rubber growth by scattering leaf disease germs over the area. But it is not believed likely either the Japanese or the United Nations would resort to such destructive effort.

Requirements: With civilian requirements scaled down to 150,000 tons for this year, the latest figures on total requirements of the United Nations add up to 813,000 tons. Out of this, 82,000 tons are earmarked for lend-lease and 310,000 tons for other countries, leaving 271,000 tons for the army, air corps and Navy. Thanks to heavy stockpiles, an indicated surplus of 428,000 tons is shown for this year.

Next year, synthetic production is scheduled to climb to 300,000 tons, from this year's total of 28,000 tons. This, added to the 1942 surplus and expected 1943 shipments, means a total supply of 861,000 tons, but because of increased military requirements a deficit of 5000 tons is indicated.

Synthetic Rubber Production: Salvation of the rubber problem rests squarely with the synthetic rubber production program which, after being kicked around for a year or more finally has settled at a projected 862,000 tons annually, out of which 32,000 tons is being financed by private capital, 30,000 tons by the Canadian government, the balance by the U. S. government.

May Reach Peak in 1945

By the first quarter of next year, the synthetics will be starting to roll, and in 1944 output is expected to reach 650,000 tons, in 1945 the peak of 862,000 tons. This is a whale of a lot of rubber, especially when it is realized that Axis nations now are using rubber on the basis of only 150,000 tons a year, the bulk of this government subsidized synthetic production. Russia has capacity for only about 50,000 tons of synthetic rubber a year.

Most of the synthetic plants will be making rubber by the butadiene-styrene polymerization process, the butadiene coming from both petroleum refineries and grain alcohol distillation. Units will approximate 40,000-ton size a year, providing no delays are met in construction.

Largest plant in the U. S. now in commercial operation in the manufacture of the butadiene type synthetic rubber is that originally engineered and built by B. F. Goodrich, operating under patents and technique developed by this company. This plant now is known as the Hycar Chemical Co., a corporation jointly owned by Phillips Petroleum and Goodrich. Present production is at a rate of 7000 tons annually and represents the culmination of 16 years of continuous research and development directed by Dr. Waldo L. Semon, director of synthetic rubber research at Goodrich.

This Goodrich rubber is considered superior to the German Buna rubbers, although it is of the same chemical family. Two years ago the rubber was announced publicly under the trade names Liberty Rubber and Ameripol, with two objectives in mind; first to challenge scientists to speed up development of American-made rubber, and second to focus national attention on dangerously low stocks of natural rubber on hand then—around 148,000 tons, or a minimum working level. Several thousand tires of 50 per cent Ameripol were produced and sold at a price approximately 30 per cent higher than first quality natural rubber. Many favorable reports from the "public testing laboratory" have been received.

Synthetic rubbers of the butadiene-base type, it is hoped, can be made to perform with 90 per cent of the efficiency of natural rubber in tires, although several problems still await solution in respect to truck tires. This high performance compares with the 35 per cent efficiency of butyl synthetics and such interim materials as Thiokol.

Sets Automatic Ceiling

It is estimated butadiene rubber can be made and sold at a profit for 25 cents a pound, including amortization of plants. Plantation rubber normally could be sold at 10-12 cents on the New York market, with a profit, although back in the depths of the depression natural rubber sold for as low as 2¾ cents a pound. Average New York market price in the last two years has been close to 20 cents a pound.

It is on this score that many look on the projected synthetic rubber plants as valuable "automatic ceilings" on natural rubber prices in time of peace, and as priceless "standby" facilities in the event of war. It is reasoned that if the U. S. is to become a leader in a new order of world thought and world trade following the war, it certainly will not be possible to close the door on natural rubber and use only domestic-produced synthetics. The synthetic plants will have to mark time (at government expense) while we drop all tariff barriers and resume buying rubber from the Far East.

It may be necessary to step into the Far East with guarantees of higher wages and better living conditions for the natives who collect the rubber latex from the trees, thereby perhaps doubling the price we pay for natural rubber. Essentially this amounts to raising the standard of living in subnormal

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countries at the expense of living standards in our own country. Whether the people in this country will ever swallow such altruistic policies is open to question. Perhaps the easiest way to effect the change would be to persuade the CIO to establish a branch in the Far East and unionize the plantation workers. Then a world labor board could grant higher wages and the checkoff system, and the higher costs would automatically be passed along to the American public.

Scrap and Reclaim: Existing facilities for reclaiming scrap rubber can handle about 400,000 tons of scrap a year, processing it into 320,000 tons of reclaim rubber. In the first two months of this year, scrap rubber was coming in at a rate of only 50 per cent of the maximum usable amount. This has gradually increased until last month when scrap shipments slightly exceeded consumption. The scrap rubber drive sponsored by the oil companies was called disappointing in Washington because it yielded only 250,000 tons. Stacked against the pure guesses as to available tonnage made before the drive, it probably is disappointing, but nonetheless the campaign was productive of well over half a year's supply of material for present reclaiming plants.

If rubber recovery could be made a permanent proposition on the basis of, say, 40,000 tons a month, there would be ample supplies of material for reclaiming.

The largest stockpile of rubber, of course, is in the tires and tubes now on the 150,000,000 wheels of cars, trucks and buses in operation. This amounts to 1,200,000 tons, nearly twice the stockpile of new rubber on hand. In addition there are 6,000,000 new tire casings held in storage for rationing. At the present rate of release they would be sufficient for 12 years but they do not amount to much when compared with tire sales of 35,000,000 units in a good retail year.

Current facilities for recapping or retreading tires can handle only 750,000 tires a month, and all of the camelback used for this retreading is produced from reclaimed rubber. Should new retreading materials become available, as seems likely this fall, it may be necessary to supplement field facilities with those of the large rubber plants to handle the vastly accelerated retreading business.

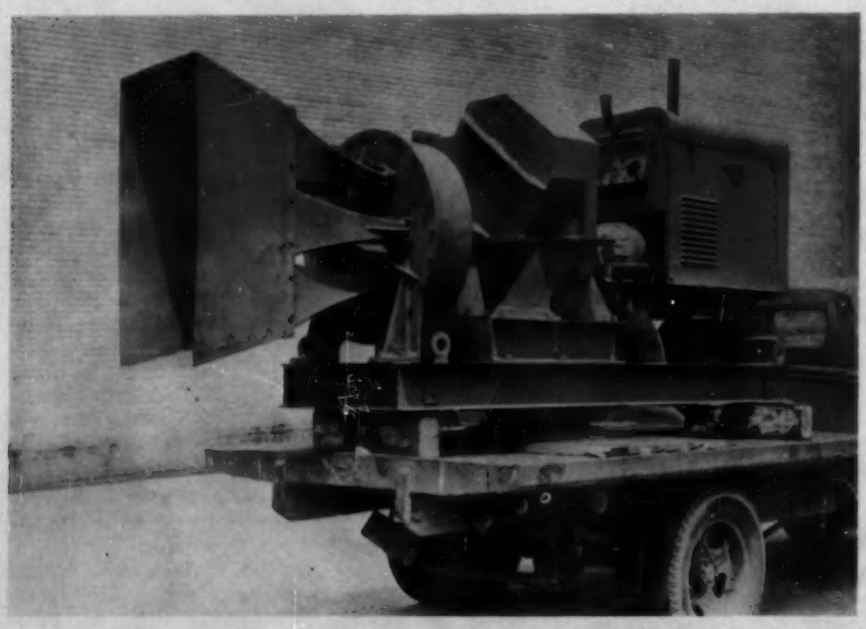
War Shipments Booming

Automotive Branch of the WPB announces April shipments of war products from 432 plants of 157 companies, which make up 72 per cent of the automotive industry (based on labor) were 46 per cent over the February total. Companies included 8 automobile manufacturers, 9 truck companies and 140 parts producers. Shipments amounted to $420,000,000, of which 83 per cent were war goods.

Since some of these shipments are inter-company, a more accurate representation of the production achievement is in terms of value added, or the difference between the money value of shipments and the cost of materials and parts supplied. These 432 plants had a total value added on war work in April of $188,000,000, compared with $123,000,000 in February. Man-hours worked in these companies increased from 65,000,000 in February to 104,000,000 in April. Total employment was 561,480, of which 413,656 were production workers.

Increases in May and June have further expanded these totals, though perhaps at a somewhat decelerating rate. When the 432 plants under consideration reach maximum war production, it is estimated total man-hours will be 112,500,000 monthly. Obviously shipments will expand at a more rapid rate than man-hours, since in preparatory and preliminary stages of production a relatively higher ratio of man-hours to shipments is required than when production is rolling smoothly.

Several floors in the downtown Buhl building here have been taken over by the procurement and distribution divisions of the Quartermaster Motor Transport Service, activities transferred here from Washington and Holabird, Md. Location of these agencies here in the heart of the motor industry is a logical move in the interests of speed and efficiency. Historic Fort Wayne in Detroit has served the Army as its central Quartermaster Motor Supply Depot since September, 1940, and it has expanded steadily since that time, last fall a $630,000 warehouse being added. Many temporary buildings have been built and commercial warehouses and field space leased to store the thousands of tons of motor supplies awaiting shipment to Army units at home and overseas. Procurement orders run into millions of dollars monthly, while thousands of tons of motor supplies are checked by the supply division and shipped to other quartermaster depots or to stations at home and abroad every week.



CHRYSLER-BELL victory siren, pictured above, produces 170 decibels of sound at the horn, claimed by Chrysler engineers to be the "loudest sustained noise ever produced by mechanical means." For description, see accompanying text

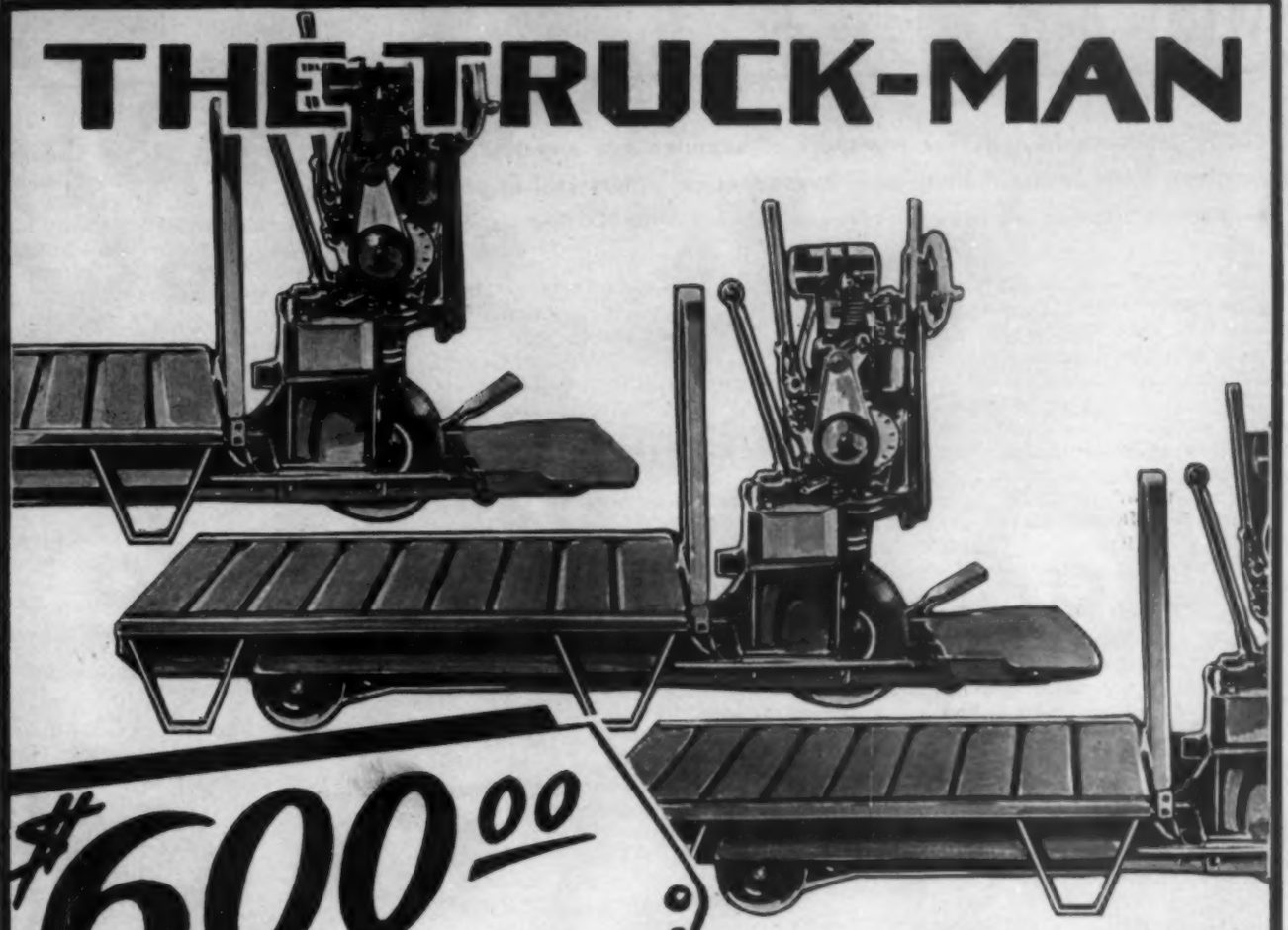
170-Decibel Siren in Mass Production by Chrysler

Large-scale production on a new air-raid alarm siren of the most powerful type ever designed will be started shortly by the industrial engine division of Chrysler Corp., Detroit. Known as the Chrysler-Bell victory siren, the device is the result of joint study by Chrysler engineers and Bell Telephone Research Laboratories. Bell engineers established the sound-producing principle and Chrysler translated their experiments into a practical production unit. The siren is capable of producing the most penetrating sustained sound—170 decibels at the throat—ever achieved by mechanical means.

The apparatus comprises the siren proper or modulator unit, a blower to supply compressed air and a 140-horsepower automobile engine to drive both. It is mounted on a turntable platform that may be placed on top of a building or in any other elevated position where the sound

(*Please turn to Page* 127)

THE TRUCK-MAN



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WING TIPS

Cargo planes hold hope for transport of supplies and munitions to far-flung battlefronts. Some now in production, others still in planning stage. Motors are ready . . . New wind tunnel for North American

ATTENTON of military strategists and logisticians for the United Nations, such as General Somervell's board in Washington known as the SOS (Services of Supply), quite naturally is turning to the airplane as a carrier of men and freight to theaters of war. Long, hazardous sea lanes mean months for transporting munitions and other war materiel to far off scenes of action in Egypt, Russia and Australia. Time being of the essence if steady Axis advances are to be stopped, speedy air travel may supply the answer if sufficient numbers of cargo carriers can be mustered.

For over a month, a WPB committee on cargo planes has been studying all the available facts relating to cargo planes, including the past use of airplanes for carrying cargoes and the future possibilities of such transportation techniques as they relate to production problems arising from the war effort. Personnel of the committee includes Harold E. Talbott, deputy director of the WPB production division; T. P. Wright, assistant chief of the aircraft branch of WPB; W. B. Harding, vice president of the Defense Supplies Corp. of the RFC; Lewis Douglas, deputy to Admiral Land in the War Shipping Administration; Dr. Jerome C. Hunsaker, chairman of the National Advisory Committee for Aeronautics; Robert Hinckley, assistant secretary of commerce in charge of aviation; Col. R. B. Lord, assistant director of the Board of Economic Warfare; Grover Loening, consulting engineer for Gruman Aircraft Corp., and G. B. Lambert, member of the executive staff of the WPB.

While a fact-finding committee may represent a good start, it is not going to be productive of very many cargo planes ready to fly. Conspicuous by their absence on the board are such airplane-cargo experts and advocates as Glenn Martin, Charles H. Babb, Harlan D. Fowler, W. B. Stout and others. These gentlemen know the facts; they could skip the preliminary studies and draw up a manufacturing program for immediate adoption. There is the very real danger that Nelson's committee will spend months digging up facts, preparing a report and submitting it for consideration, after which the findings will be kicked around in Congress and nothing will happen.

Of course, cargo carriers and troop transports are already coming from airplane assembly lines, but they are conventional types of craft and not the types of sky freighters visioned by Martin, Stout & Co. One type now abuilding is the C-46, originally the Curtiss CW-20, a transport designed for passenger use in 1941; the other is the C-54, military version of the Douglas DC-4 transport. Both these two-motor ships are fast, large and possessed of characteristics giving long range and heavy payload. Military versions reduce excess weight to allow for increased payload.

An example of what can be done with a Douglas DC-3 is seen in the recent evacuation of refugees from Burma, where a number of these ships were in service, manned by both British and American pilots. Those serviced by American forces had all the seats ripped out and the normal 21-passenger cabin was crowded with as many as 75 refugees, some even being stowed in baggage and freight compartments. For some reason the British-operated transports were not so stripped.

Lockheed Has Cargo Carrier

Soon to join the C-46 and C-54 is the Lockheed Constellation, a four-motor ship with capacity of 64 passengers, including a crew of seven, or over 16 tons of cargo when used as a freighter. Motors are Wright Cyclones of better than 2000 horsepower. Cruising speed is 283 miles an hour, range over 4000 miles, and supercharged engines and cabin permit operation up to 30,000 feet. Even a plane of this size, however, could not accommodate a medium tank, despite the fact that 40 of them could move 1,000,000 pounds of cargo overnight from West Coast to Honolulu.

There are a number of other specialized cargo ships designed and a few are now in the construction stage. Military censorship prevents disclosure of details. One group of air freight experts has gone on record as stating the most effective cargo plane for continental and hemispheric operations is a high-wing twin-engine monoplane, with retractable landing gear, built around a cargo space 25 x 8 x 8 feet in size. This compares with box car dimensions of 40 x 9 x 9 feet. Materials would be steel, plywood and fabric, conserving aluminum and magnesium for combat planes.

Composite types of cargo planes have been designed by Charles H. Babb and Harlan D. Fowler. The Babb plane has a front fuselage section which is completely removable for the landing, by means of a ramp, of bulk pieces like trucks, machinery, etc. The Fowler plane features a fuselage made up of five separate and detachable cargo containers, each holding about 1000 pounds.

Rapid progress is now possible in the cargo plane field, for one reason because engines with proved horse-

DESIGN picture of projected Glenn Martin 250,000-pound flying boat, discussed in detail in WING TIPS, May 11, p. 66. Mr. Martin recently received the American Design award for development of this colossus and the smaller 140,000-pound flying boat, MARS, now undergoing flight tests. The new ship should be able to carry 102 passengers, each with 25 pounds of luggage, plus 25,000 pounds of mail and cargo, from New York to London in 13 hours

TAKE *Guesswork* OUT OF PRODUCTION

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Victory production — the steady stream of machined parts for finished war products — isn't achieved by guessing. The selection of the proper tool set-up, correct speeds and feeds, and the right application of the right cutting lubricant are all important for machine tool operation at rated capacity-plus.

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"LET'S GO! U.S.A." "KEEP 'EM FLYING!"

PERFORMANCE DATA

OPERATION — Tapping ring nuts.

MACHINE — 3-L Gisholt Turret Lathe.

MATERIAL — Forged steel.

CUTTING LUBRICANT — 1 part Sunoco to 15 parts water.

SUN PETROLEUM PRODUCTS HELPING INDUSTRY HELP AMERICA

power, economy and service life can be produced in the large quantities necessary. High horsepower is essential, since the number of engines for large transport ships is limited by problems of the growing intricacy of controls, added weight and service problems.

In any type of plane, the engine must have a high takeoff horsepower in order to get the ship into the air with its maximum load; as well as low fuel consumption at cruising speeds and low weight per horsepower. In addition, long service life between overhauls is of vital importance.

Grover Loening, consulting engineer for Grumman, declared recently that 40,000 planes of the size of the present B-19 superbomber could carry cargo equivalent to the capacity of 20,000,000 tons in surface shipping, the aggregate of all the surface ships in the United Nations' pool. He added that 45,000 aircraft of the type now being flown day in and day out could carry the freight now being hauled by nearly 2,000,000 freight cars.

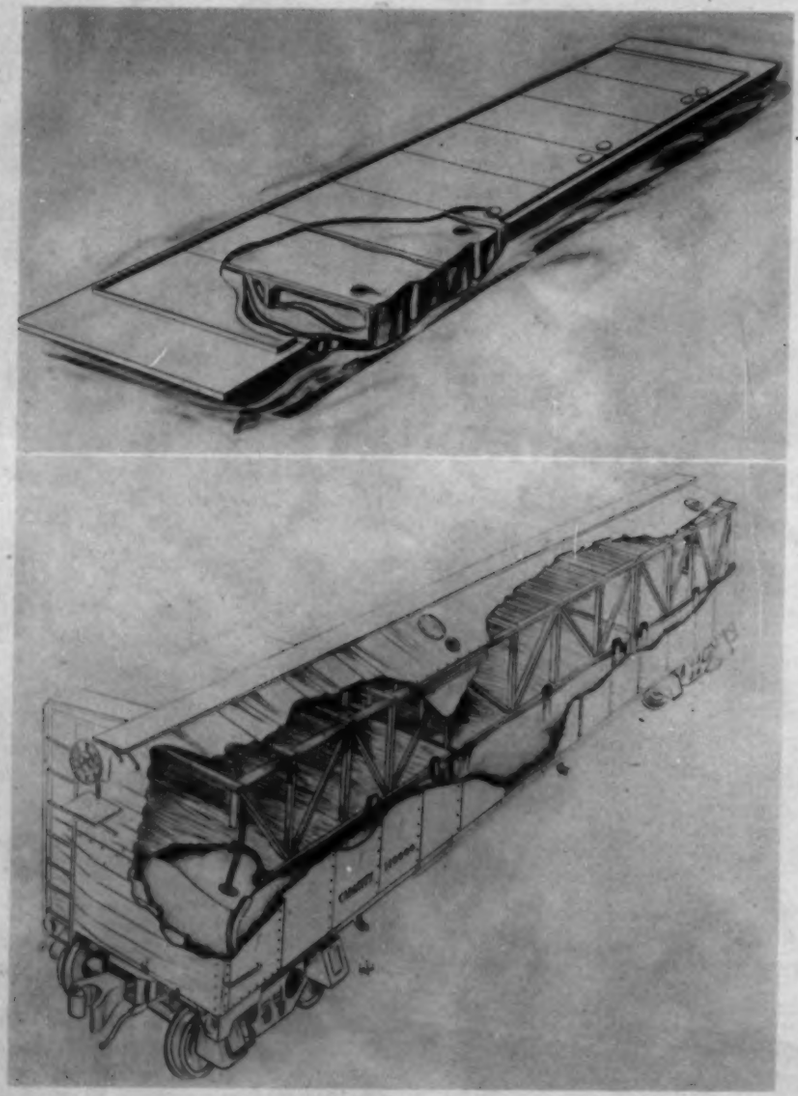
These declarations must be tempered by the observation that individual heavy loads such as tanks and field guns and trucks cannot now be moved by air, as any summary of aggregate freight movement must likewise give consideration to the heft of individual loads if it is to mean anything.

The day is not too far off when mass production of a four-motor plane somewhat larger in size than the Boeing Flying Fortress but smaller than the huge B-19 will be under way. Such a plane might logically be considered a long-range bomber, but could be adapted for cargo handling or troop transport with a minimum of alteration.

Time is still the adverse factor. Consider what might be done now for China with a fleet of long-range cargo planes capable of carrying 40 tons each and escorted by long-range bombers, defensively and offensively armed to the teeth. Arms and supplies might be flown in to Chiang Kai-Shek, once reconnaissance planes had charted a route to miss the many unmapped mountain peaks of interior China, thereby conceling the advantage now resting with the Japanese as a result of their closing the Burma road and holding the China coast.

But as yet we do not have the planes, let alone the bases and ground crews to service such an air freight expedition, so China in the light of some expert opinion is "out of the war."

Gliders, too, will eventually play a significant part in the air transport of men and munitions. The Germans used the nucleus of thousands of pilots trained in sports gliders for the organization of their currently powerful air force. In recent months the call has gone out for glider experts from our own Air Force command, and glider schools are now in full operation. Time alone will prove their value.



AIRPLANE type of fuel tank, known as the Mareng cell, developed by Glenn L. Martin Co., Baltimore, may have possibilities in petroleum transport. Here are suggested applications in a conventional boxcar and wooden barge

Rectangular Wind Tunnel

New wind tunnel with throat air speed equivalent to 327 miles per hour is nearing completion at North American Aviation in Inglewood, Calif. It is of the continuous type, in the form of a rectangle and rectangular in cross section, narrowing to a throat of 7¾ feet high and 11 feet wide where model testing is done. Air blast is provided by a seven-blade 19-foot diameter propeller driven by a 3000-horsepower electric motor mounted in a nacelle in the tunnel on the "back stretch." Speed of the prop can be varied in the range of 70-700 r.p.m.

Air leaving the propeller passes halfway around the tunnel, which is gradually increasing in size, until it reaches the throat where the sudden contraction steps up the speed of the airflow to the maximum of 327 m.p.h. In the throat the model is suspended in the air stream by struts which in turn are connected to an eltromagnetic balance which records the various stresses developing in the model. Test models are of wood, built to exact scale and have built-in electric motors turning model propellers. They are built in a model shop which is on the second floor of the tunnel building, permitting planes to be lowered directly into the test chamber from the shop in which they are made. The complete tunnel installation will not go into operation until early fall.

Possibilities of Mareng Cell

Suggested solution to the problem of transporting motor fuel to distressed localities has been offered by airplane builder Glenn L. Martin. It involves the use of the Mareng (MARtin ENGineering)

(Please turn to Page 127)

AJAX

Now Delivering Huge 8-Inch Forging Machines at an Unprecedented Rate

These 8-inch, 470,000 pound Ajax Forging Machines are the largest ever built with the rigid one-piece integral bed frame.

BUY FORGING EQUIPMENT ON THE BASIS OF MECHANICAL SOUNDNESS

● No comfort in that performance for the Axis, but plenty for American industry and its craftsmen, driving hard day and night to turn out more and better weapons of war—*in time!* The output of these 470,000 pound 8-inch Ajax Forging Machines has been stepped up tremendously. We are now equipped to again step up even this output . . . and do it without sacrificing established Ajax Standards of mechanical soundness.

Improvement of Ajax manufacturing facilities and training of new craftsmen—initiated ahead of need—is enabling us to accomplish this without tying up vitally needed heavy machine tool capacity outside of our own plant. Output of other sizes of Ajax Forging Machines and Forging Presses is up too, assuring that the productive ability of American war workers may be utilized to the very utmost in producing the vital fighting equipment that can be formed better, faster and cheaper on Ajax Forging Machinery.

The high standards of production, accuracy, and dependability being established by Ajax Forging Machines under the gruelling pace of war production emphasizes again the wisdom of buying forging equipment on the basis of mechanical soundness. For more information on Ajax Air Clutch Forging Machines, write for Bulletin 65-B.

THE AJAX MANUFACTURING COMPANY
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Activities of Steel Users and Makers

JOSEPH T. Ryerson & Son Inc., Chicago, with steel warehouses in various cities, has arranged to stock the various NE (National Emergency) steels to supply small lots for test and experimental purposes. The company also is urging customers to report quickly on results obtained in fabricating and heat treating these new low-alloy steels. Purpose is to obtain and consolidate information which will hasten a changeover to the new steels without disrupting present manufacturing operations.

♦

Pennsylvania railroad is stencilling "Buy War Bonds" on 500 box cars, covering an area 9 feet 4 inches in length.

♦

Square D Co., Milwaukee, has opened a branch office at 146 Chestnut street, Springfield, Mass., with C. T. Nash in charge, to serve the Hartford, Conn., Springfield, Vt., Worcester, Mass., and Providence, R. I., area.

♦

Savage Tool Co. has moved its plant and offices from Minneapolis to Savage, Minn., where a new plant, 85 x 225 feet, has been erected.

♦

Pacific Tool & Supply Co., 344 North Vermont avenue, Los Angeles, has changed its name to Brand Tool & Supply Co.

♦

Carboloy Co. Inc., Detroit, has announced a further increase in manufacturing facilities for standard tools. The tool department of a General Electric Co. subsidiary in the Illinois region, formerly manufacturing appliances, has been equipped to produce such tools from carbide materials furnished by and under subcontract from Carboloy, also a subsidiary of GE.

♦

Through revision of construction plans, more than 900 tons of steel will be saved in a building to house National Aluminum Cylinder Head Co., new subsidiary of National Bronze & Aluminum Foundry Co., Cleveland, for which ground was broken recently. It will have 200,000 square feet of floor space. Site is adjacent to parent company's Laisy avenue structure which now includes a training school for foundry workers under TWI sponsorship.

♦

Belle City Malleable Iron Co., Racine, Wis., has issued an illustrated booklet, marking its fiftieth anniversary. It is informative on the higher grades of ferrous castings, malleable in regular, high-strength and pearlitic, steel, and electric furnace gray iron.

♦

McCarthy Bros. Construction Co., St. Louis, has been awarded a contract by the War Department for building an alien camp "somewhere in Missouri," of about 216 buildings, to cost $1,000,000, under jurisdiction of United States Engineers Office, Kansas City, Mo.

♦

Contract for engineering services for a $3,000,000 addition to a small arms ammunition plant near St. Louis has been awarded to Mauran, Russell, Crowell & Mullgart, architects of St. Louis, and Giffels & Vallet Inc., Detroit. The job is solely for addition to existing facilities.

♦

Victor Equipment Co. is now handling the complete line of stainless and alloy electrodes manufactured by Arcos Corp., Philadelphia. The Victor company has sales offices in Los Angeles, San Francisco, and Fresno, Bakersfield and San Diego, Calif., and in Phoenix, Ariz.

♦

J. F. Pritchard & Co., Kansas City, Mo., recently enlarged its division of chemical design, engineering and construction to meet growing requirements of the new Petrol-Chemical industry. Dr. W. W. Deschner, formerly in charge of the department of chemical engineering, University of Kansas, is head of the division.

♦

Foundry Division of North Wales Machine Co. Inc., North Wales, Pa., will henceforth be operated as a separate company under the name of King Foundries Inc., with no change in officers or address.

♦

Contracts for an addition to the Euclid, O., plant of Thompson Aircraft Products Co., subsidiary of Thompson Products Inc., Cleveland, amounting to more than $8,000,000 were recently awarded by officials of the firm which operates a new $15,000,000 plant manufacturing aircraft engine valves and parts. Funds are being provided by Defense Plant Corp.

♦

American Locomotive Co. dedicated its Chicago Heights, Ill., plant to war production in a ceremony June 29. The plant, one of seven operated by the company, was idle during the depression but has been reconditioned and improved at a cost of $1,645,000 for production of steel ingots, forgings, tank parts and navy materials.

♦

Lessons from Lightning

STUDY of the holes made by lightning in this copper sphere during the seven years that it topped the 878-foot antenna tower of station WSM, Nashville, Tenn., enabled Dr. Karl B. McEachron, left, and J. H. Hagenguth, right, of the General Electric High Voltage Laboratory, Pittsfield, Mass., to work out a formula for calculating the quantity of electricity in the lightning strokes that made them. Surprisingly small amounts of electricity are involved even in large lightning strokes. For example, their calculations show the stroke that produced the largest hole, nearly 1-inch in diameter, contained only enough electricity to light a 40-watt lamp about 80 seconds

New Agents Named by Machinery Companies

New agents have been appointed by Cincinnati Bickford Tool Co. in place of Henry Prentiss & Co., who recently discontinued business.

Wigglesworth Machinery Co., 199 Bent street, Cambridge, Mass., will cover Connecticut, Massachusetts, Rhode Island, New Hampshire, Vermont and Maine.

Eastern New York state and northern New Jersey will be handled by Rudel Machinery Co., 200 Fifth avenue, New York, with whom are associated L. H. Pratt, W. O. Graham and Frank Hamilton, formerly with the Prentiss organization.

C. H. Briggs Machine Tool Co. Inc., Onondaga Building, Syracuse, N. Y. will take care of central New York and northeastern Pennsylvania. Mr. Briggs, president, has been covering this area for the Henry Prentiss Company for the last several years.

Western New York, including Buffalo and Rochester, will be served by George Keller Machinery Co., 1807 Elmwood avenue, Buffalo. E. F. Morgan and J. A. Carter, formerly with the Buffalo office of the Henry Prentiss Co. are now associated with this concern.

Lodge & Shipley

Lodge & Shipley Machine Tool Co., Cincinnati, has completed arrangements with four companies to handle the sale of their lathes and Duomatics in the area formerly covered by Henry Prentiss & Co., who have retired from business.

General Machinery Corp., 140 Federal street, Boston, covers Massachusetts, Rhode Island, Maine, New Hampshire and Vermont.

Wilson Brown Co., 5200 Chrysler building, New York: Eastern section of New York state, northern part of New Jersey, and all of Connecticut.

C. H. Briggs Machine Tool Co., Onondaga building, Syracuse, N. Y.: Control New York state and northeastern counties of Pennsylvania.

George Keller Machinery Co., 1807 Elmwood avenue, Buffalo: Buffalo and Rochester areas.

Brassert & Co. License Sale of Equipment

H. A. Brassert & Co., consulting engineers, have made an exclusive license arrangement, effective June 1, with S. P. Kinney, formerly vice president of the company, covering the manufacture, sale and installation of all equipment previously made and distributed by the Brassert organization.

Consisting mainly of accessory equipment used in blast furnace operation, the list of items includes: Hot blast stove checker systems; burners; valves of various types; gas washers; primary and secondary gas cleaners; self-cleaning strainers; revolving distributors and other similar products. Main offices of the Brassert company are at 60 East 42nd street, New York, where they conduct their iron and steel plant designing, construction and consulting engineering business.

Restrictions on the sale of safety razors by manufacturers and jobbers have been lifted by the WPB, indicating the Armed Services have satisfied requirements during the May-June freeze. WPB has indicated additional supplies using substitute materials will be made available for both military and civilian demand.

Reclaiming Tin

NEWARK, N. J.: Salvaging tin in tooth paste and shaving cream tubes which customers have piled up in the retail stores in this area is under way in a one-story brick building on the Jersey Meadows, located there because of rank odor from burning paste. It is known as the Tin Salvage Institute, employs 40 workers, and reclaims 2 tons of tin per day.

Top: After caps are removed, tubes are dumped into hopper, conveyor belt brings them to group of girls who sort the tin tubes from the lead and aluminum. Lower: Tin is drawn off into molds, making 100-pound pigs. NEA

War Metallurgy Committee Will Co-ordinate Research Activities

EXPERIENCE of 10,000 scientists, representing more than 125,000 man-years' research and accumulated laboratory data, is being brought to bear on the problems of making the most efficient use of available metals in the war effort, through an organization set up by private and public research agencies.

Much already has been done, and future research is expected to be better co-ordinated under a recently established War Metallurgy Committee, composed of leading research men.

Dr. Frank B. Jewett, president of the National Academy of Sciences, Washington, last week outlined the work of the committee and also reported on the achievements of the academy's Metals and Minerals Advisory Committee. The latter committee during the past 18 months has supplied OPM and WPB with 113 reports; 53 were on metals substitution and conservation; 47 on ferrous metals and ferroalloys; 4 on tin smelting and reclamation; and 9 on nonmetallic minerals. Since Pearl Harbor the committee's work has been greatly expanded. Its work will be increased further as it functions for and with the new War Metallurgy Committee which has been set up primarily to appraise and conduct needed research work for the Army, Navy, WPB and other governmental agencies as well as for industry.

The new committee has three major functions; 1 — Formulating and placing research projects; 2—supervising the operation of these researches; 3—correlating the committee's work with war metallurgical research of other government agencies, industrial and university research and with foreign research.

The Metals and Minerals Advisory Committee serves both the WPB and the War Metallurgy Committee on problems involving production, substitution and conservation of strategic materials.

Nerve Center for Research

The War Metallurgy Committee and the advisory committee, according to Dr. Jewett, will function as the nerve center for all metallurgical research organizations and departments in this country. Heads of any business, university or research organization will be expected to make available to the committee the experience of their metallurgical scientists and engineers and their laboratory data.

Thus will be made available to the Army and Navy, either through the WPB or the Office of Scientific Research and Development, the services of any or all research personnel and facilities in the country. The academy estimates there are more than 10,000 persons engaged in such research and that their combined experience represents more than 125,000 man-years.

One basic consideration in the formation of the War Metallurgy Committee was the saving of time, mistakes and money. Whenever a problem is proposed, either through WPB or the OSRD, immediate action can be obtained by telephone communication with leading scientists on that particular subject; initial committee meetings may be held within 24 hours and a plan of procedure laid down.

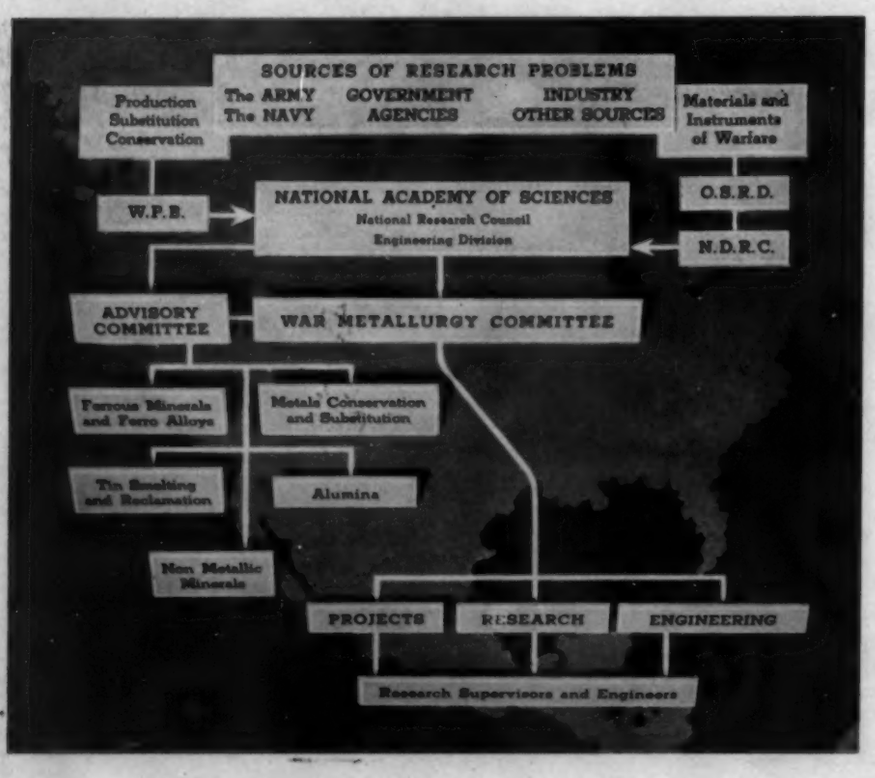
Another function of the War Metallurgical Committee is to digest and make available to the proper persons the results of Canadian and English research. Many of the problems are common and the interchange of information is expected to make available to all the best thinking and practice of scientists and industrialists on both sides of the Atlantic.

Typical of the problems referred to the committee is one asking for improvement in welding processes. A subcommittee was immediately appointed which collected data from engineering foundations, research departments of business organizations and universities. The project section of the committee worked up the research indicated, research procedure, and with the approval of the National Defense Research Committee and OSRD, placed the research with university laboratories qualified for the work.

Another typical request for data was that from the WPB of the effect of substitution of lead-silver for tin-lead soldering of tin cans used for food products. Since a large proportion of tin consumed is used for soldering, the substitution of lead-silver for tin-lead soldering was obviously required, but the problems involved, in certain canning processes, are such that definite research is needed before such substitution can be ordered.

The project has been prepared and will be administered through the committee's research section, the work being done in a large university research laboratory, in cooperation with the National Canners Association.

Membership of War Metallurgy Committee and the advisory committee is representative of leading scientists and industrialists. Members follow:



War Metallurgy Committee

Includes 26 members, as follows: Chairman, Clyde Williams, director, Battelle Memorial Institute, Columbus, O.; vice chairman, Zay Jeffries, director of research, General Electric Co., Cleveland; secretary, Louis Jordan, National Academy of Sciences, Washington; Carl Breer, vice president, Chrysler Corp., Detroit; Dr. Lyman J. Briggs, director, U. S. Bureau of Standards, Washington; Col. H. H. Zornig, Ordnance Department, Watertown Arsenal, Watertown, Mass.; James H. Critchett, vice president, Union

Carbide & Carbon Research Laboratories, New York.

Col. R. S. A. Dougherty, manager, research and development, Bethlehem Steel Co., Bethlehem, Pa.; Rudolph Furrer, vice president, A. O. Smith Corp., Milwaukee; Dr. H. W. Gillett, chief technical advisor, Battelle Memorial Institute, Columbus, O.; S. D. Heron, Ethyl Gasoline Corp., Detroit; Dr. R. P. Heuer, vice president, General Refractories Co., Philadelphia; Col. G. F. Jenks, Ordnance Department, Washington.

Dr. John Johnston, director, research laboratory, U. S. Steel Corp., Kearny, N. J.; Dr. Vsevolod N. Krivobok, director of research, Lockheed Aircraft Corp., Burbank, Calif.; Frederick Laist, general metallurgical manager, Anaconda Copper Mining Co., New York; Dr. W. K. Lewis, head of department chemical engineering, Massachusetts Institute of Technology, Cambridge, Mass.; Dean C. E. MacQuigg, College of Engineering, Ohio State University, Columbus, O.

C. E. McCuen, vice president, General Motors Corp., Detroit; Dr. Robert F. Mehl, director, metals research laboratory, Carnegie Institute of Technology Pittsburgh; Dr. Paul D. Merica, vice president, The International Nickel Co. Inc., New York; Dr. Gilbert E. Seil, technical director, E. J. Lavino & Co., Norristown, Pa.; Captain Lybrand Smith, Office of Coordinator of Research & Development, Navy Department, Washington; Dr. F. W. Willard, president, Nassau Smelting & Refining Co., New York; Dr. Robert S. Williams, head, department of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.; Col. A. E. White, University of Michigan, Ann Arbor, Mich.

The Advisory Committee is composed of 63 regular committees, plus 20 other specialists who are called in frequently for advice on specific problems. Regular members are, according to subcommittees:

Ferrous Minerals, Ferroalloys

Gilbert E. Seil, chairman, E. J. Lavino Co., Norristown, Pa.; A. C. Fieldner, secretary, U. S. Bureau of Mines, Washington; Ralph Bowman, Republic Steel Co., Cleveland; Frederick G. Cottrell, Washington; James Critchett, Union Carbide & Carbon Research Laboratories, New York; John V. N. Dorr, The Dorr Co., New York; Charles H. Herty Jr., Bethlehem Steel Co., Bethlehem, Pa.; Donnell F. Hewett, U. S. Geological Survey, Washington; John Johnston, United States Steel Corp., Kearny, N. J.; Frederick Laist, Anaconda Copper Co., New York; Enoch Perkins, Mutual Chemical Co. of America, New York.

Metals Conservation, Substitution

Zay Jeffries, chairman, General Electric Co., Cleveland; Paul D. Merica, vice chairman, International Nickel Co., New York; W. H. Eisenman, secretary, American Society for Metals, Cleveland; Robert S. Archer, Republic Steel Corp., Chicago; E. W. Bennett, Dow Chemical Co., Midland, Mich.; A. L. Boegehold, General Motors Corp., Detroit; S. K. Colby, Aluminum Co. of America, Pittsburgh.

Major G. L. Cox, Ordnance Department, Watertown Arsenal, Watertown, Mass.; D. K. Crampton, Chase Brass & Copper Co., Waterbury, Conn.; Lieut-Col. L. S. Fletcher, Frankford Arsenal, Philadelphia; John R. Freeman Jr., American Brass Co., Waterbury, Conn.; James P. Gill, Vanadium-Alloys Steel Co., Latrobe, Pa.; H. W. Gillett, Battelle Memorial Institute, Columbus, O.; W. C. Hamilton, American Steel Foundries, East Chicago, Ind.

Charles H. Herty Jr., Bethlehem Steel Co., Bethlehem, Pa.; John Johnston, United States Steel Corp., Kearny, N. J.; A. B. Kinzel, Union Carbide & Carbon Research Laboratories, New York; Robert H. Leach, Handy & Harman, Bridgeport, Conn.; Robert F. Mehl, Carnegie Institute of Technology, Pittsburgh; W. M. Peirce, New Jersey Zinc Co., Palmerton, Pa.; Albert J. Phillips, American Smelting & Refining Co., Barber, N. J.

William B. Price, Scovill Mfg. Co., Waterbury, Conn.; H. S. Rawdon, Bureau of Standards, Washington; Walter C. Smith, Cerro de Pasco Copper Co., New York; Jerome Strauss, Vanadium Corp. of America, New York; W. P. Woodside, Climax Molybdenum Corp., Detroit; F. W. Willard, Nassau Smelting & Refining Co., New York.

Nonmetallic Minerals

R. P. Heuer, chairman, General Refractories Co., Philadelphia; Paul Tyler, secretary, United States Bureau of Mines, Washington; L. E. Barringer, General Electric Co., Schenectady, N. Y.; G. A. Bole, Orton Ceramic Foundation, Columbus, O.; B. C. Burgess, United Feldspar & Minerals Corp., Spruce Pine, N. C.; W. S. Landis, American Cyanamid Co., New York; M. M. Leighton, State Geological Survey Division, University of Illinois campus, Urbana, Ill.

G. R. Mansfield, United States Geological Survey, Washington; Oliver C. Ralston, United States Bureau of Mines, College Park, Md.; Robert B. Sosman, United States Steel Corp., Kearny, N. J.; John D. Sullivan, Battelle Memorial Institute, Columbus, O.; Frank J. Tone, Carborundum Co., Niagara Falls, N. Y.; William M. Weigel, Missouri Pacific Railroad, St. Louis; R. B. Wittenberg, International Agriculture Corp., New York.

Tin Smelting, Reclamation

F. W. Willard, chairman, Nassau Smelting & Refining Co., New York; P. M. Ambrose, secretary, Bureau of Mines, Washington; W. K. Lewis, Massachusetts Institute of Technology, Cambridge, Mass.; M. F. McConnell, Carnegie-Illinois Steel Corp., Pittsburgh; Walter C. Smith, Cerro de Pasco Copper Co., New York; John F. Thompson, International Nickel Co., New York.

Alumina Subcommittee

John D. Sullivan, chairman, Battelle Memorial Institute, Columbus, O.; Francis C. Frary, Aluminum Co. of America, New Kensington, Pa.; Oliver C. Ralston, United States Bureau of Mines, College Park, Md.; R. S. Sherwin, Reynolds Metals Co., Sheffield, Ala.; Arthur Fleischer, Kalunite Co., Salt Lake City, Utah.

Associations and technical societies in the metallurgical field are taking an active part in the problems of metallurgical reports and research. Among those now cooperating in the program are: American Institute of Mining and Metallurgical Engineers; American Society for Testing Materials; American Society of Mechanical Engineers; American Society for Metals; Society of Automotive Engineers; Engineers Defense Board; American Institute of Chemical Engineers; Army Ordnance Association; American Iron and Steel Institute; and American Ceramic Society.

East-Central Areas Have Major Share Of War Contracts

Total of government contracts for new war plant, facilities and materials from June, 1940 through first quarter 1942 was $55,800,000,000. Of this amount, $50,500,000,000 was scheduled for allocation to specific production areas, but due to unequal distribution of existing facilities in some regions and inadequate facilities requiring development or new construction in others, disproportionate expansion resulted.

Analysis of total awards in the 22 months by National Industrial Conference Board, New York, shows that regional expansion was most heavily concentrated in central areas. Five east-north-central states held 25 per cent of the total. Middle Atlantic states received 22.2 per cent, while the Pacific region took 16.1 per cent, the only other area to be allotted over 10 per cent. Among the states, California led with 10.8 per cent; New York received 9.2 per cent; Michigan held 8.2 per cent; Ohio had 7.8 per cent, and Pennsylvania and New Jersey each received 6.5 per cent of the total commitments for war plant and war supplies. Almost half of all awards were placed in these six states.

Plants Widely Distributed

In contrast, the awards for war plant and equipment alone, totaling $10,700,000,000, have been spread more broadly over the states. For example, the mountain region, with only 1.7 per cent of the supply contracts, received 3.5 per cent of plant awards; the Pacific area, with 16.2 per cent of material contracts, took only 6.6 per cent of the total war plant allotment; New England, with 8.8 per cent of the material contracts, received only 4.6 per cent of plant awards. West-north-central and east-south-central regions both showed marked gains in war plant expansion.

Plant Expansion in Peace and War

Region	% Distribution of Capital Outlays in Manufacturing, 1939	% Distribution of Government Plant Awards, June, 1940-March, 1942
New England	8.4	4.6
Middle Atlantic	24.5	18.1
East North Central	33.0	32.6
West North Central	4.6	10.3
South Atlantic	11.6	7.1
East South Central	4.0	6.1
West South Central	6.0	11.0
Mountain	1.3	3.5
Pacific	6.7	6.6

U. S. Steel Capacity 65 Per Cent Greater Than That of Axis Europe

STEEL productive capacity in the United States is nearly 65 per cent higher than combined capacity of Germany and all of Europe now controlled by the Axis.

If Germany could operate every iron and steel plant in Europe outside of Russia, at their highest rate, total steel output would be 53,000,000 net tons, it is estimated by the American Iron and Steel Institute. This would be about 35,000,000 tons less than annual capacity in the United States as of Jan. 1, 1942.

Total steel ingot capacity of Axis Europe is divided as follows, in net tons:

Germany	24,700,000
France	10,700,000
Belgium	4,500,000
Italy	3,000,000
Luxembourg	3,000,000
Czechoslovakia	2,500,000
Poland	1,700,000
Sweden	1,200,000
Hungary	800,000
Austria	700,000
Spain	700,000
Rumania	300,000
Total	53,800,000

Comparison of capacities of the United Nations and the Axis, in net tons, follows:

United Nations	
United States	88,570,000
British Empire	20,600,000
Russia	21,800,000
Total	130,970,000
Axis	
Europe	53,800,000
Japan	7,200,000
Total	61,000,000

While some of the steel capacity in Axis controlled countries may have been damaged, such losses may have been offset by new plants in Germany. Reports from France and Italy indicate output has been greatly curtailed by shortage of raw materials, and transportation difficulties. Production in other conquered countries is also believed to have declined.

Axis Europe has mines sufficient to produce iron ore, coal and limestone to operate all iron and steel plants at capacity. However, some mines are distant from plants and the quality of ore is low or mediocre. This has imposed a heavy burden on railroad facilities already strained by military requirements.

The Axis apparently faces great insufficiency in certain strategic alloying elements, especially manganese, nickel and chromium. Large reserve stockpiles are known to have been accumulated by Germany before the war.

Countries in Axis Europe are able to mine only 30 per cent of manganese, 40 per cent of chromium and 10 per cent of nickel needed for capacity output of steel. These percentages assume the Axis need for alloy steels is proportionate to that in this country's war program.

Germany always has beeen almost entirely dependent upon imports for chromium, nickel, tungsten, cobalt, tin and vanadium and imported more than half its manganese requirements. Part of these supplies came from countries now at war with Germany or from overseas countries not now accessible.

Additional chromium supplies were made available by invasions of Norway, Albania, Greece and Yugoslavia and domination of Rumania and Bulgaria. The quantity now obtainable, however, must be still far below Germany's estimated war needs.

New manganese sources were obtained in France, Bulgaria, Greece, Yugoslavia, Hungary, Czechoslovakia and Poland. Additionally, the German forces captured the Nikopol mining area in the Russian Ukraine in 1941 but this district is close to the fighting front and probably of little use to Axis steel plants.

Small nickel reserves of Germany and Italy have been supplemented by those of Finland, Norway and Spain but these additions probably fall far short of supplying sufficient for alloy demand.

In addition to use of steel plants of conquered countries Germany has obtained valuable coal and ore resources. The most important iron ore districts are in Lorraine and at Krivoi Rog in Russia. The Lorraine ore has helped meet Germany's need for richer ore, though it may have curtailed supply to steel plants in France.

Safety Glass

ST. LOUIS

A pocketful of glass eyes proved an effective argument in a campaign among metal workers by the St. Louis Council. Reyburn P. Hoffman, secretary of the Council, recently lecturing to lathe workers, exhibited the eyes and said: "If any of you would prefer one of these to his natural eye, you can afford to be less careful."

Several foremen obtained supplies of the eyes which they offer to workers who neglect to wear goggles.

Salesmen, Now Factory Workers, in "Duration Club"

In Rome, N. Y., recently, 13 men sat down for dinner, preceded by a general get-together. All of them, former salesmen, are now working in the factory of Rome Mfg. Co., a division of Revere Copper & Brass, Inc. The men have formed an "exclusive private club" which they have called the "Duration Club"—because they hope it won't last forever. Until they are back as salesmen, they serve as timekeepers, payroll clerks and bookkeepers.

In the group, seated: J. M. Kennedy, vice president, Rome Mfg. Co. division; J. J. Zingerline, J. H. Finnegan, E. E. Wood, C. P. Drake, sales managers. Standing: S. R. Knight, G. W. VanDewalker, H. W. Fisk, L. T. Stannard, J. F. Butts, J. A. Preisendorfer, R. E. Conley and H. J. Humphrey. C. Donald Dallas, president, Revere Copper & Brass, is an honorary member.

Industrial Activity Continues Upward Trend

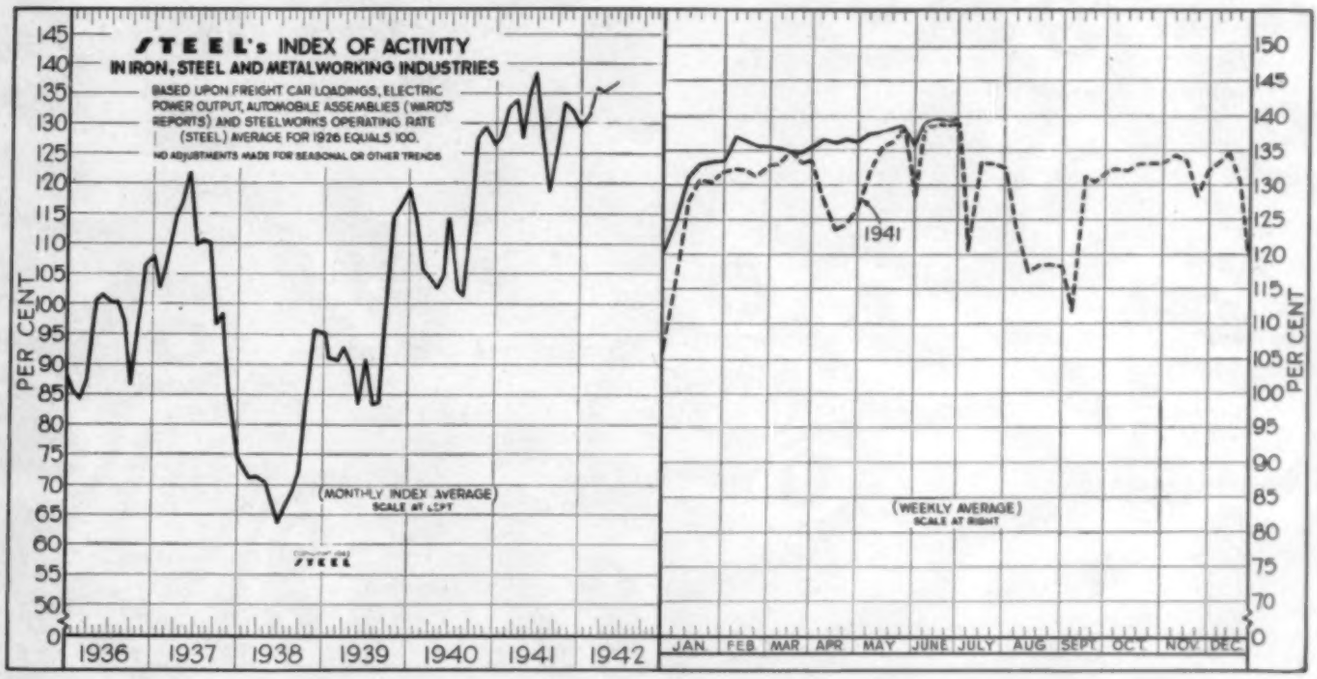
INDUSTRIAL activity continued to move steadily upward throughout June, extending the gains recorded during April and May. STEEL's weekly index averaged 139.2 last month, comparing with 137.4 in May and 138.7 during June, 1941. Reflecting the all-out effort to increase output of military materials, most plants maintained full operations over the Fourth of July holiday.

During the week ended June 27, STEEL's index advanced slightly to 139.6. This represents a gain of 0.3 point from the preceding week's index figure and compares with 138.8 recorded in the like period a year ago.

The national steel rate was off one half point to 98.5 during the week ended June 27. Percentagewise, steel production is below the 99.5 per cent level recorded this time last year, but output tops a year ago on a tonnage basis. Steel scrap is moving to mills in greater volume. However, the scrap drive is disappointing in so far as collections are not sufficient to permit accumulation of stocks at mill yards for use throughout the winter months.

Electric power consumption totaled 3,457,024,000 kilowatts during the latest period. This compares favorably with 3,433,711,000 kilowatts consumed in the preceding week and represents a gain of 9.5 per cent over that recorded in the like 1941 week.

Revenue freight carloadings edged slightly upward during the week of June 27 to about 850,000 cars. A year ago freight traffic totaled 908,664 cars. There are grounds for optimistic belief that the railroads will be able to meet fully this year's freight traffic demands, Joseph B. Eastman, director, Office of De-


STEEL's INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARD'S REPORTS) AND STEELWORKS OPERATING RATE (STEEL) AVERAGE FOR 1926 EQUALS 100.
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
(MONTHLY INDEX AVERAGE) SCALE AT LEFT
1936 1937 1938 1939 1940 1941 1942
1941
(WEEKLY AVERAGE) SCALE AT RIGHT
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

STEEL's index of activity advanced 0.3 point to 139.6 in the week ending June 27:

Week Ended	1942	1941
April 25	136.3	126.5
May 2	137.2	132.6
May 9	137.5	135.9
May 16	137.9	136.1
May 23	138.1	138.6
May 30	136.0	128.4
June 6	138.4	138.4
June 13	139.5	138.7
June 20	139.3	138.7
June 27	139.6†	138.8

†Preliminary.

Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Jan.	131.3	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1
Feb.	136.3	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
March	135.2	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
April	136.6	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
May	137.4	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
June	139.2	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
July	.....	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Aug.	.....	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Sept.	.....	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Oct.	.....	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
Nov.	.....	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
Dec.	.....	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3

fense Transportation, told rail executives recently. American Trucking Association reports freight transported by motor carriers in May decreased 3 per cent from April, but was 2.6 per cent above tonnage moved in May, 1941.

Inventories, in terms of dollars based on cost values, were down 3 per cent at the close of April, according to the Department of Commerce. This is the first month since December, 1940, that an inventory decline has occurred. Compared with April 30, 1941, inventories are up 16 per cent.

Shipments of new machine tools, presses and other metalworking equipment totaled $118,500,000 during May, the War Production Board reports. Machine tool shipments alone, 25,700 units, were valued at $107,300,000, compared with April's showing of 25,400 units valued at $103,364,000. Metalworking machinery output is running at the rate of $1,400,000,000 annually, an increase of 65 per cent over the 1941 volume, and is steadily expanding.

American Gear Manufacturers Association's index on industrial gear sales rose to 421 during May, compared with 378 in April and 273 during May, 1941. Orders for new foundry equipment declined in May, according to the Foundry Equipment Manufacturers Association.

Where Business Stands

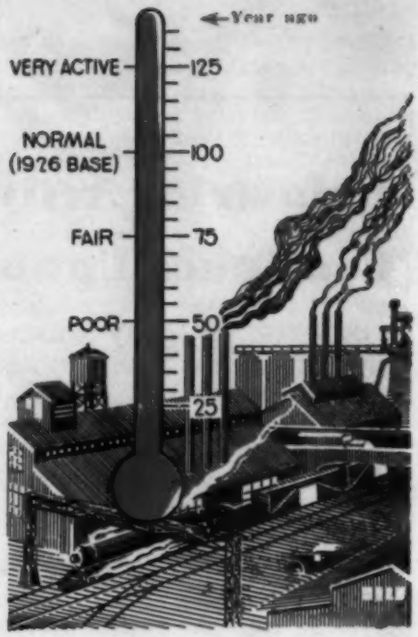
Monthly Averages 1941=100

	May, 1942	April, 1942	May, 1941
Steel Ingot Output	104.8	104.0	91.0
Finished Steel Shipments	107.5	103.1	102.3
Freight Carloadings	101.0	103.0	103.4
Freight Car Awards	81.2	209.8	184.0
Structural Steel Shipments	92.4	96.5	102.3
Building Construction	134.5	99.6	109.6

Industrial Weather

TREND:

Upward



The Barometer of Business

Financial Indicators

	May, 1942	Apr., 1942	May, 1941
30 Industrial Stocks*	11.68	11.06	17.30
20 Rail Stocks*	68.30	67.52	84.71
15 Utilities*	24.29	24.56	28.25
Average Price of all listed bonds (N.Y.S.E.)	$95.64	$95.63	$94.22
Bank Clear'gs daily average (000 omitted)†	$1,108	$1,164	$1,049
Commercial Paper, interest rate (4-6 months)	⅛–¼	⅛–¼	⅛–¼
Com'l loans (000 omitted)‡	$10,905	$11,337	$10,030
Federal Reserve ratio (per cent)	89.8	90.6	91.1
Capital flotations: (000 omitted)			
New Capital	$127,570	$157,820	$105,973
Refunding	$52,461	$104,328	$299,269
Federal gross debt, (mil. of dol.)	$68,571	$64,961,000	$47,737,000
Railroad earnings†	$101,994,561	$92,388,079	$52,074,739
Stock sales, New York Stock Exchange	7,229,097	7,589,297	9,660,000

*Dow Jones series.
‡Leading member banks Federal Reserve System.
†April, March and April respectively.

Commodity Prices

	May, 1942	Apr., 1942	May, 1941
STEEL'S composite finished steel price average	$56.73	$56.73	$56.73
U. S. Bureau of Labor's index	98.7†	98.8	84.9
Wheat, cash (bushel)	$1.21	$1.215	$1.038
Corn, cash (bushel)	$0.965	$0.998	$0.83

†Preliminary.

Industrial Indicators

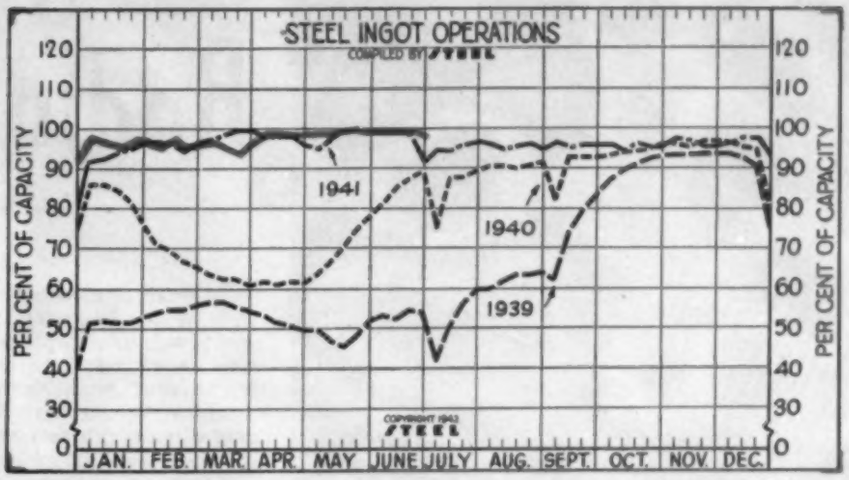
	May, 1942	Apr., 1942	May, 1941
Iron and Steel Scrap consumption (tons)	4,857,000	4,672,000	4,609,000
Gear Sales Index	421	378	273
Foundry equipment new order index	653.6	1089.3	423.3
Finished steel shipments (Net tons)	1,834,127	1,758,894	1,745,295
Ingot output (average weekly; net tons)	1,667,470	1,660,213	1,590,195
Commercial steel castings production†	149,625	146,507	101,977
Dodge bldg. awards in 37 states ($ Valuation)	$673,517,000	$498,742,000	$548,700,000
Fabricated structural steel shipments (Tons)	173,321	180,987	191,905
Steel castings output (Net Tons)†	191,195	211,081	152,007
Coal output, tons	48,250,000	49,000,000	43,400,000
Business failures; number†	938	1048	1149
Business failures; liabilities†	$10,175,000	$13,241,000	$15,068,000
Cement production, bbls.†	14,068,000	12,733,000	12,196,000
Cotton consumption, bales	957,015	998,754	923,518
Freight Car Awards	822	2,125	18,630
Car loadings (weekly av.)	825,452	837,759	841,557

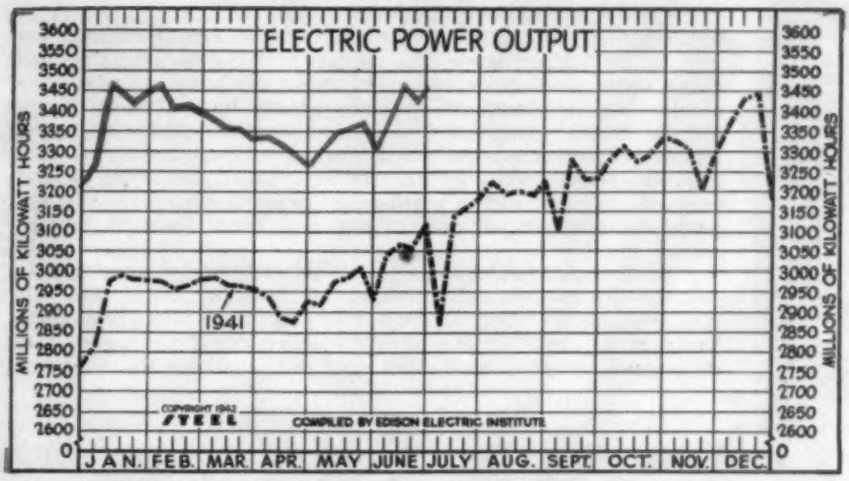
†April, March and April respectively.

Steel Ingot Operations

(Per Cent)

Week ended	1942	1941	1940	1939
June 27....	98.5	99.5	89.0	54.0
June 20....	99.0	99.0	88.0	54.5
June 13....	99.0	99.0	86.0	52.5
June 6....	99.0	99.0	81.5	53.5
May 30....	99.0	99.0	78.5	52.0
May 23....	99.0	100.0	75.0	48.0
May 16....	99.5	99.5	70.0	45.5
May 9....	99.0	97.5	66.5	47.0
May 2....	99.0	95.0	63.5	49.0
April 25...	98.5	96.0	61.5	49.0
April 18...	98.5	98.0	61.5	50.5
April 11...	98.5	98.0	61.0	51.5
April 4....	98.0	98.0	61.5	53.5
Mar. 28....	97.5	99.5	61.0	54.5
Mar. 21....	95.5	99.5	62.5	55.5
Mar. 14....	95.5	98.5	62.5	56.5




ELECTRIC POWER OUTPUT
MILLIONS OF KILOWATT HOURS
1941
COPYRIGHT 1942 STEEL
COMPILED BY EDISON ELECTRIC INSTITUTE
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

Electric Power Output

(Million KWH)

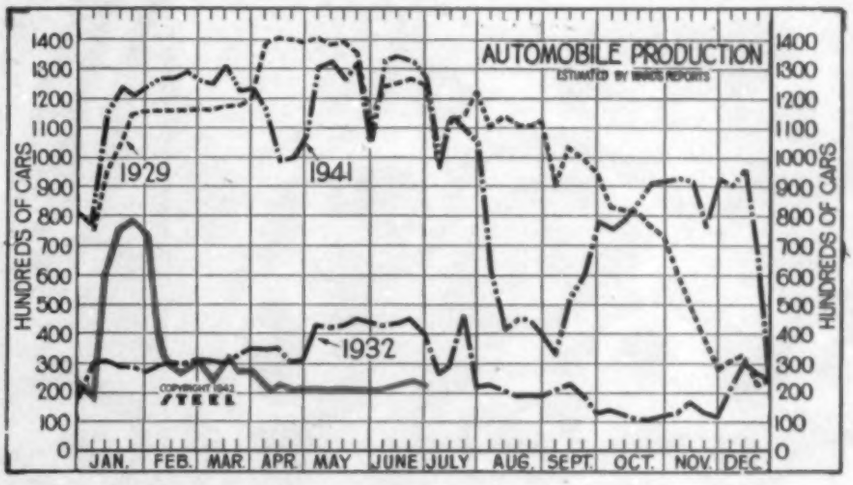
Week ended	1942	1941	1940	1939
June 27.....	3,457	3,121	2,660	2,396
June 20.....	3,434	3,056	2,654	2,362
June 13.....	3,464	3,066	2,665	2,341
June 6.....	3,372	3,042	2,599	2,329
May 30.....	3,323	2,924	2,478	2,186
May 23.....	3,380	3,012	2,589	2,778
May 16.....	3,357	2,983	2,550	2,235
May 9.....	3,351	2,975	2,516	2,239
May 2.....	3,305	2,915	2,504	2,225
April 25.....	3,299	2,926	2,499	2,244
April 18.....	3,308	2,874	2,529	2,265
April 11.....	3,321	2,882	2,530	2,235
April 4	3,349	2,938	2,494	2,244
Mar. 28.....	3,346	2,956	2,524	2,272
Mar. 21.....	3,357	2,964	2,508	2,258
Mar. 14.....	3,357	2,965	2,550	2,276
Mar. 7.....	3,392	2,987	2,553	2,285

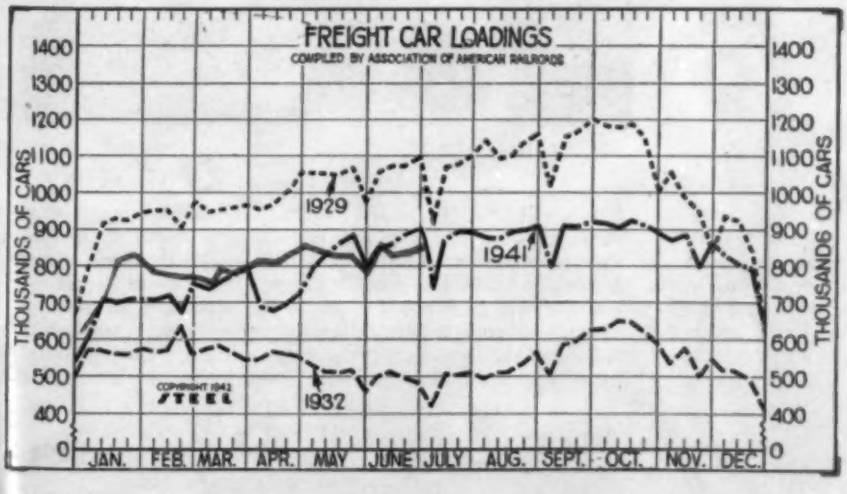
Auto Production

(1000 Units)

Week ended	1942	1941	1940	1939
June 27....	22.9	127.9	87.6	70.7
June 20....	23.2	133.6	90.1	81.1
June 13....	22.3	134.7	93.6	78.3
June 6....	22.0	133.6	95.6	65.3
May 30....	21.5	106.4	61.3	32.4
May 23....	21.6	133.6	96.8	67.7
May 16....	21.8	127.3	99.0	80.1
May 9....	21.5	132.6	98.5	72.4
May 2....	22.0	130.6	99.3	71.4
April 25...	21.9	108.2	101.4	86.6
April 18...	21.7	99.9	103.7	90.3
April 11...	23.0	99.3	101.9	88.1
April 4....	22.3	116.3	101.7	87.0
Mar. 28....	28.9	124.2	103.4	86.0
Mar. 21....	28.9	123.8	103.4	89.4

†Canadian trucks and automobiles and United States trucks, since week of Feb. 21 last.





Freight Car Loadings

(1000 Cars)

Week ended	1942	1941	1940	1939
June 27.....	850†	909	752	666
June 20.....	840	886	728	643
June 13.....	833	893	712	638
June 6.....	855	853	703	635
May 30.....	796	802	639	568
May 23.....	838	866	687	628
May 16.....	839	861	679	616
May 9	839	837	681	555
May 2.....	859	794	666	573
April 25.....	855	722	645	586
April 18.....	847	709	628	559
April 11.....	814	680	619	548
April 4.....	829	683	603	535
Mar. 28.....	805	792	628	604

†Preliminary.

Radio Research and P

. . . . given great impetus by war

IN THE greatest expansion of radio facilities in the history of the industry, research men are working on developments which will prove as startling when peace returns as the telephone and electric light were in an earlier generation. Radio, first developed on a large scale as a result of military needs in World War I, is now undergoing a second great period of research and expansion. Once again, war will probably give us new and amazing tools.

Compared to our present facilities, the armies of World War I were relatively without radio "voice" or "hearing" until late in the conflict. When the United States entered the war in 1917, there were only 50 aircraft radios available and these were limited in range of communication. Today, the men who pilot America's military planes have modern transmitters which often go into action simultaneously with the pilots' guns. Voice communications, co-ordinating aircraft with ground or sea forces during actual combat, are now a vital part of military tactics, although radios are generally silent until the presence of the planes has been detected by the enemy.

Even tanks now have voice transmitters and receivers to provide greatest co-ordination of mechanized units. FM, the frequency modulation system, has improved tank broadcasting, further reducing the interference caused by the operation of engines, motors and other electrical equipment. Westing-

Fig. 1—POWER ON PARADE: A total of 100,000 watts of radio transmitting power is represented in this bank of Westinghouse broadcasting tubes. Largest air-cooled tubes of their kind in the world, these transmitting giants are now at work beaming United States broadcasts to South American nations. Airplane-type fins carry away enough heat from each tube to keep a small house warm in winter

Fig. 2—INSPECTED FOR SHIPMENT: A battery of high-powered radio transmitting tubes for naval signal communications is checked out for shipment to Navy by Westinghouse girl inspector. Tubes operate in compact transmitters carried aboard ships and installed in land stations

Fig. 3—COMPLETING "MOUNT" ASSEMBLY FOR RADIO TUBES: Operator is completing the assembly of the "mount" or inner structure of a 25-watt Westinghouse transmitting tube used largely for plane-to-plane or plane-to-ground radio communication. She is spot-welding a part to one of the wires which support the structure. At the instant the weld is made between the two metal pencil-like points over the operator's gloved hand, a tiny gas flame spurts from the slender copper pipe and envelops the spot being welded, preventing oxidation

Fig. 4—CLEAR, MUSICAL NOTE and she knows that the radio transmitting tube she is testing is ready for service. The photo shows the "noise test" where required current is supplied and the tube is tapped lightly with a soft rubber rod. A high, clear note in the operator's headphones indicate a good tube. A scratching, gutteral noise usually means loose or improperly fastened parts in the tube's inner structure. In the latter event, the tube is rejected and destroyed

Production

house is now producing many of the transmitting tubes for Army FM tank sets.

Taking a tip from the London policemen who several years ago wore tiny radio transmitters in their hats, the Signal Corps is now equipping its men with 1-watt "broadcasting stations". Like walking patrol cars, parachute troops and riflemen equipped with these 5-pound sets are now able to carry on conversation with their comrades 2 miles away.

Police patrol cars also have their counterpart in armored trucks and other motorized units which have been equipped with radio transmitters to receive and broadcast "on-the-spot" military intelligence, time signals and weather reports.

For short-wave broadcasting stations fighting the Axis nations in a "war of the air waves", Westinghouse is said to be producing the largest air-cooled transmitting tubes in existence. These giant tubes, cooled by airplane-type fins, consume 25,000 watts each and generate enough excess heat to keep a 6-room house warm in winter.

Development by Westinghouse of large air-cooled broadcasting tubes has helped to enlarge the scope of military radio communications. With air-cooled tubes, powerful stations can be set up in the field or on shipboard without the need for a steady supply of fresh water for cooling. This is particularly important for naval vessels where fresh water is at a premium. Salt water cannot be used to cool the tubes.

Fig. 5—HOT TONGUES OF FLAME from a dozen gas jets are played on the rim of this 400-watt radio broadcasting tube as a craftsman in glass seals the filament mount (cathode) to the tube proper. For this purpose the tube is placed in the jaws of a lathe and rotated rapidly while the operator, using a small metal paddle, shapes the hot glass as desired

Uses and Possible Substitutes for COBALT

CONSUMPTION of cobalt in the United States has increased remarkably during the past two decades, and a substantial gain is anticipated in 1942. Although the United States is the chief consumer of cobalt, this country has been an unimportant factor in its production. The Belgian Congo, Northern Rhodesia and French Morocco have supplied the bulk of the world output in recent years. Production in Canada, formerly the chief source of cobalt, has gradually declined and in recent years has had minor importance only.

Except for a small domestic output, the United States depends on the Belgian Congo for its supplies of cobalt. In the unfortunate event that those supplies should be shut off, the United States would face the problem of finding substitutes or developing low-grade deposits, some of which probably could be placed in production as an emergency supply. Purifications of solutions for electrolysis to produce manganese metal would make available another source of cobalt as a sulphide sludge containing large quantities of cobalt could be recovered from many domestic manganese ores.

War conditions emphasize the important use of cobalt in high-speed cutting tools. Other uses are: Permanent magnet materials, welding materials, metal-to-glass seal materials, ceramics, driers, and miscellaneous applications of small amounts, as for catalysts and soft magnetic alloys.

Cobalt high-speed steels are used for specific purposes more especially where high red-hardness is necessary. *Apparently, high vanadium is the best substitute* for cobalt in steels for this class of work. Cemented carbide tools can often be substituted for the cobalt high-speed steels. Low-cobalt high-speed steels, or those containing no cobalt, can be used with a small loss in cutting speeds and production rates. Nickel can be substituted for cobalt as a binder in cemented carbide tools, but usually with resulting impairment too great to be tolerated except in an emergency.

Cobalt also occupies a critical position among the alloying elements for permanent magnets. However, iron-molybdenum, iron-tungsten, chromium-molybdenum, iron-nickel-aluminum and low-cobalt-iron-nickel-aluminum precipitation-hardening alloys can be made to replace many of the cobalt magnet steels and alloys. Again, however, certain combinations of desirable properties are obtainable only by definite cobalt alloys. Redesigning of magnet shapes in accordance with the magnetic properties of non-cobalt or low-cobalt materials can effect considerable conservation of cobalt in the manufacture of permanent magnets.

The use of welding rod containing substantial amounts of cobalt is important in a war economy. Hard-wear or corrosion-resistant surfaces are applied, and worn surfaces can be built up to the original dimensions, thus salvaging dies and many other wear-resistant surfaces.

Small amounts of cobalt are needed for metal-to-glass seals in the manufacture of radio power tubes, X-ray tubes and other electronic devices. Larger quantities may be needed for superchargers.

The use of cobalt in ceramics is evidently not critical, with the possible exception of its application to ground coats for porcelain enamel ware. It is believed that a large proportion of the cobalt oxides and salts now going into the ceramics industry could be diverted to other more important uses.

Cobalt driers show the most rapid drying times of all metal driers used in the paint and varnish industry. Manganese driers can be used, with the consequence of approximately doubling the drying time. Cellulose and other lacquers requiring no "drying" oils should be used wherever possible if it is desired to reduce the quantity of cobalt going into paint and varnish driers.

Catalysts and soft magnetic alloys do not represent much of the cobalt consumption and, in both instances, acceptable substitutes are believed to be available for a substantial portion of the uses.

Reports to the Bureau of Mines from virtually all domestic manufacturers who use cobalt in steels and as catalysts indicate a probable consumption of 2,128,000 pounds in 1941, distributed as follows: Cutting tools and drills, 43 per cent; welding rod and stock, 18; dies, valve steel and electroplating, 2; magnets, 28; special steels, 6; catalysts and dental and surgical alloys, 3.

Tool Steels and Cutting Alloys: An important use of cobalt is in the manufacture of high-speed cutting tools for operation at high speeds or at high temperatures. It also is employed in alloy steels for high-temperature dies, heavy-duty shears, and other implements requiring extreme toughness combined with great hardness at high temperatures. Certain high-temperature noncorrosive alloys are made with small amounts of cobalt in their composition.

Typical analyses of some commercially available high-speed steels are shown in Table I. The usual alloying elements are carbon, tungsten, chromium, vanadium and cobalt. Small amounts of other elements are found occasionally in special steels. The steels listed in Table I may be roughly divided into two classes upon the basis of the predominating alloying element. These are: Tungsten steels such as Nos. 1, 2, 8, 9, 10, 11 and 12; and molybdenum steels such as Nos. 3, 4, 5, 6, and 13. The so-called cobalt high-speed steels are, in general, simply modifications of these two types.

The addition of cobalt to standard high-speed steels improves their cutting performance under some conditions. It is not substituted for any other alloying metals. The fact that cobalt also dissolves tungsten in amounts up to 30 per cent and that a tungsten-cobalt compound is precipitated upon reheating also explains some of the benefits derived from cobalt by the tungsten steels, which are improved by the addition of cobalt in amounts up to 12 to 13 per cent. In general, the cutting ability is proportional to the cobalt content up to about 13 per cent.

It is reported that 5 per cent cobalt added to an 18 per cent tungsten alloy increases its "perform-

---

From a report by John Koster, senior metallurgist, Metallurgical Division, and H. W. Davis, associate mineral economist, Metal Economics Division, both of the Bureau of Mines. The report was prepared for the War Production Board as part of the work of the Metals Conservation E Substitution Group of the Advisory Committee on Metals & Minerals of the National Research Council of the National Academy of Sciences.

ance" by 100 per cent. Ten per cent cobalt increases the performance 200 per cent and 15 to 16 per cent cobalt, 400 per cent. Tests indicate that a 12 per cent manganese steel can be worked satisfactorily with a high-cobalt high-speed steel—a feat claimed difficult with any noncobalt material. Such performance can be relied upon only for the particular conditions of these tests for machining performance tests depend on many interrelated factors.

The improvement in properties by the addition of cobalt is equally apparent in the case of the molybdenum high-speed steels. Thus, steel 13 in Table I is regarded by the manufacturer as a "super-high-speed steel" in comparison with noncobalt molybdenum steels, such as 4 and 5 in Table I. Cobalt is added to such steels in amounts up to 13 per cent.

Cobalt steels are utilized in cutting cast iron, hardened steels, and, in general, in making heavy or hogging cuts. Their cutting efficiency is not so high on softer materials. High-cobalt steels are inclined to be brittle, which is counteracted to some extent by the vanadium content. Such steels harden with a finer grain, decarburize more readily and are subject to more cracking during hardening than high-speed steels with no cobalt. The hardening temperature range is wide and the red hardness is better than in the noncobalt steels.

These statements in the literature might easily mislead one in the appraisal of the value of cobalt in high-speed steel. When the test conditions are selected near the upper limit of possible feeds and speeds, superiority of performance of the cobalt steels seems great. When the tests are conducted within the ranges of practical operation, the cobalt steels often make a poorer showing than the steels containing no cobalt. The small percentage of the cobalt high-speed steels in use, as compared with the noncobalt steels, does not provide a strong argument for the indispensability of the former.

Cobalt is also a necessary constituent of other cutting alloys, such as those of the stellite types and cemented carbides. Stellite alloys contain up to 55 per cent cobalt.

TABLE I—Composition of Typical High-Speed Steels, Per Cent

No.	Carbon	Tungsten	Chromium	Vanadium	Molybdenum	Cobalt	References
1	0.55–0.75	18.0	4.0	1.0	....	....	1 and 4
2	0.65–0.75	14.0	4.0	2.0	....	....	1 and 4
3	0.64–0.84	1.3–1.8	3.5–4.0	0.9–1.3	8.0–9.5	....	2 and 3
4	0.78	.....	3.50	1.25	9.5	....	2
5	0.79	.....	4.25	2.13	9.0	....	2
6	0.80	5.5	4.00	1.50	4.50	....	.....
7	0.78	18.47	3.92	1.86	0.53	....	2
8	0.70	14.0	4.0	2.0	0.5	5.0	1 and 4
9	0.70	18.0	4.0	1.0	0.5	5.0	1 and 4
10	0.75	14.0	4.0	2.0	0.5	5.0	1 and 4
11	0.80	20.0	4.0	2.0	0.6	8.0	1 and 4
12	0.80	20.0	4.0	1.25	0.6	12.0	1 and 4
13	0.79	1.55	3.75	1.10	7.85	5.5	2

1—This is a standard high-speed steel and is made by a number of manufacturers. Refer to *Engineering Alloys* by Woldman and Dornblatt, published by American Society for Metals, 1936.
2—*Molybdenum High-Speed Steels, Molybdenum in Steel*, published by Climax Molybdenum Co., sec. 12, p. 1.
3—Emmons, J. V., *Molybdenum-Tungsten High-Speed Steels*, published by Cleveland Twist Drill Co.
4—*Metals Handbook*, published by American Society for Metals, 1939. Refers to alloy in question in index or to list of manufacturers and tool-steel trade names on p. 18.

The tungsten carbide materials are of the sintered and fused types. In the first type, tungsten or other carbides are sintered with metallic cobalt as a binder. The quantity of cobalt used is generally about 3 to 20 per cent. The second or fused type is the product of direct fusion of the carbides, generally with cobalt.

TABLE II—Substitutes for Cobalt High-Speed Steels

	First	Second	Third
Carbon	1.00	1.25	1.25
Tungsten	18.00	....	5.50
Molybdenum	....	8.00	4.50
Chromium	4.00	4.00	4.00
Vanadium	3.00	4.00	4.00

Substitutes for Cobalt in Tools: There is a considerable tendency to regard the use of cobalt in high-speed steel as absolutely indispensable. On the other hand, some metallurgists seem to be of the opinion that cobalt use in high-speed steel could be substantially reduced if necessary. One way would be to use steels higher in vanadium. In such cases, the strategic values of cobalt and vanadium must be weighed one against the other. The compositions listed in Table II have been suggested as substitutes. In some cases these steels give better performance than the cobalt steels. Many applications of cobalt steels are for single-point cutting tools where cemented carbide tools can often be substituted to advantage, or the cobalt steel can itself be used as an inserted cutting tip instead of a solid tool.

Tantalum has been patented as an "ersatz" material for cobalt in high-speed steels of all kinds.

High-speed cobalt steels may perhaps be replaced by carbide cutting tools or alloys based on chromium-tungsten-carbon and some metal other than cobalt. Although cobalt is recognized as the best binder for cemented carbide materials, nickel has been used, which is the substitution of one strategic metal for another.

Practical tests lead to the conclusion that none of these suggested improvements can be counted on to conserve cobalt. Tantalum, uranium and boron steels have been tried and found wanting.

Other alloys of the Kovar and Fernico type, containing around 17 to 19 per cent cobalt, are used to make vacuum-tight metal-to-glass seals. The amount used is small, but important in the construction of radio, power and X-ray tubes and other electronic devices.

A new use of alloys containing substantial percentages of cobalt is for blades of the airplane tubro-superchargers. While experiments with noncobalt alloys are in progress it now seems probable that the cobalt alloys will be preferable. If

(*Please turn to Page* 119)

TABLE III—Composition and Properties of Possible Substitutes for 8.5 Per Cent Cobalt Steel

Alloy No.	Composition, Per Cent; Iron Plus the Usual Impurities Equals the Remainder							Hardening Temperature Centigrade	Remanence, Gauss	Coercive Force, Oersteds
	Cobalt	Nickel	Aluminum	Tungsten	Chromium	Molybdenum	Carbon			
1	8.5	....	....	1.25	4.75	....	0.9	895	7500	120
2	...	....	....	....	....	23.4	...	645	7000	219
2	...	....	....	....	....	23.4	...	610	7500	120
3	...	....	....	27.9	....	....	...	700	8000	110
4	...	....	....	26.0	7.0	9.0	...	700	8000	215
4	...	....	....	26.0	7.0	9.0	...	640	7500	120
5	...	....	....	30.0	10.0	....	...	675	7000	120
5	...	....	....	30.0	10.0	....	...	700	7000	125
6	...	....	....	25.0	15.0	....	...	700	7000	180
6	...	....	....	25.0	15.0	....	...	645	7000	130
7	...	21.0	12.5	....	....	....	...	700	8000	150
7	...	21.0	12.5	....	....	....	...	675	7500	120

HEAT TREATING

CHROMIUM-CARBON STAINLESS STEELS

(Section II)

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THE EQUILIBRIUM diagram for the iron-chromium-carbon system at 12 per cent chromium is shown in Fig. 1. The increasing solubility of carbon in the gamma phase with rising temperature (line SE) is the basis for the hardness control of quenched alloys. This chart provides the quantitative explanation of the principles which permit this method of controlling the as-quenched hardness.

This analysis regards the carbide phase as a reservoir containing carbon for hardening, the extent of the withdrawal of carbon being controlled by the hardening temperature, the line SE giving the increase in carbide solubility with rising temperature.

Such a progressive solution of the carbide phase should be borne out by metallographic evidence. For this reason, the micrographs, Figs. 2 to 8 are included. Fig. 2 of an annealed sample of a steel containing 0.37 per cent carbon, 12.6 per cent chromium, reveals carbide spheroids in a matrix of chromium ferrite. Figs. 3 to 8 show this same material after hardening from successively higher temperatures covering the range from 1742 to 2100 degrees Fahr.

The gradual diminution in the amount of free carbide is clearly evident. Other phenomena which can be seen are: First, gradual agglomeration of the carbide phase at the higher temperatures; second, progressive grain coarsening with increasing temperature; third, complete disappearance of the carbide phase in the specimen hardened from 2100 degrees Fahr. Fig. 7, and consequent serious coarsening of the grain size.

The reservoir hypothesis illustrated by this series of micrographs presupposes that as long as an excess of the carbide phase is at equilibrium with the austenite phase for a given temperature and chromium content, the hardness of the martensite in the as-quenched material will be independent of carbon content. However, with increase in carbon content there is, of course, an increase in the number of carbide spheroids present at a given temperature. The hardening effect of these spheroids may account for the comparatively slight variation in hardness at a given quenching temperature. In general, the higher and lower points at each temperature tend to be the higher and lower carbon contents respectively.

In a similar series of micrographs prepared to show structural changes occurring with rise in quenching temperature for a steel containing 0.10 per cent carbon and 13.7 per cent chromium, the hardness was found to increase by an increased solution of the free ferrite phase up to a temperature of about 1740 degrees Fahr. Above this temperature, a new phase appeared, probably the delta phase, and the hard-

This is the second section of a series on heat treatment of the chromium-carbon martensitic stainless steels from a paper presented at the National Metal Congress in Philadelphia, Oct. 23, 1941. Section I appeared on p. 66 of the June 22 issue.

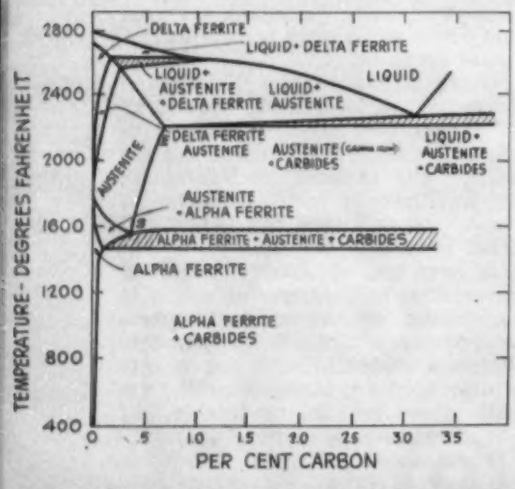
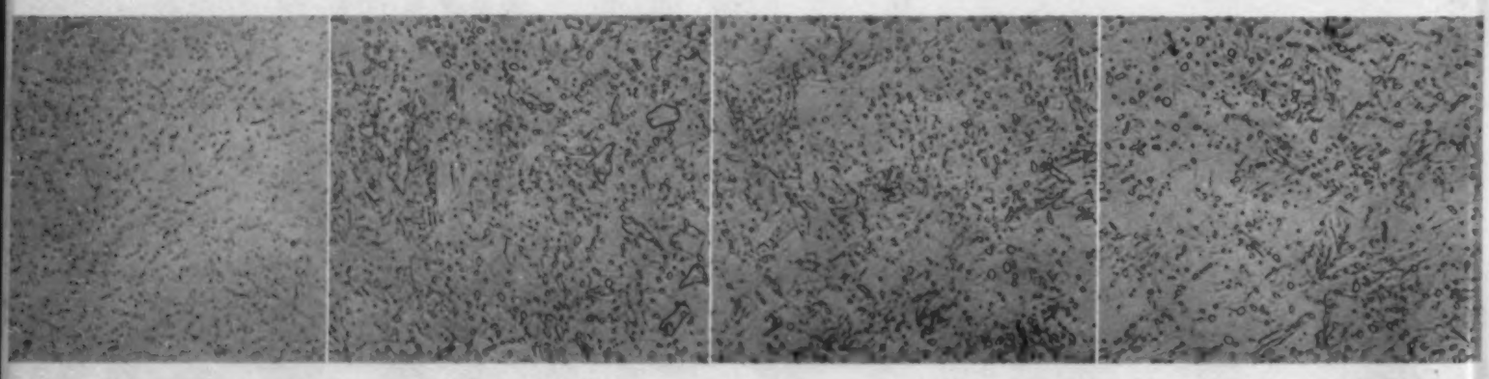
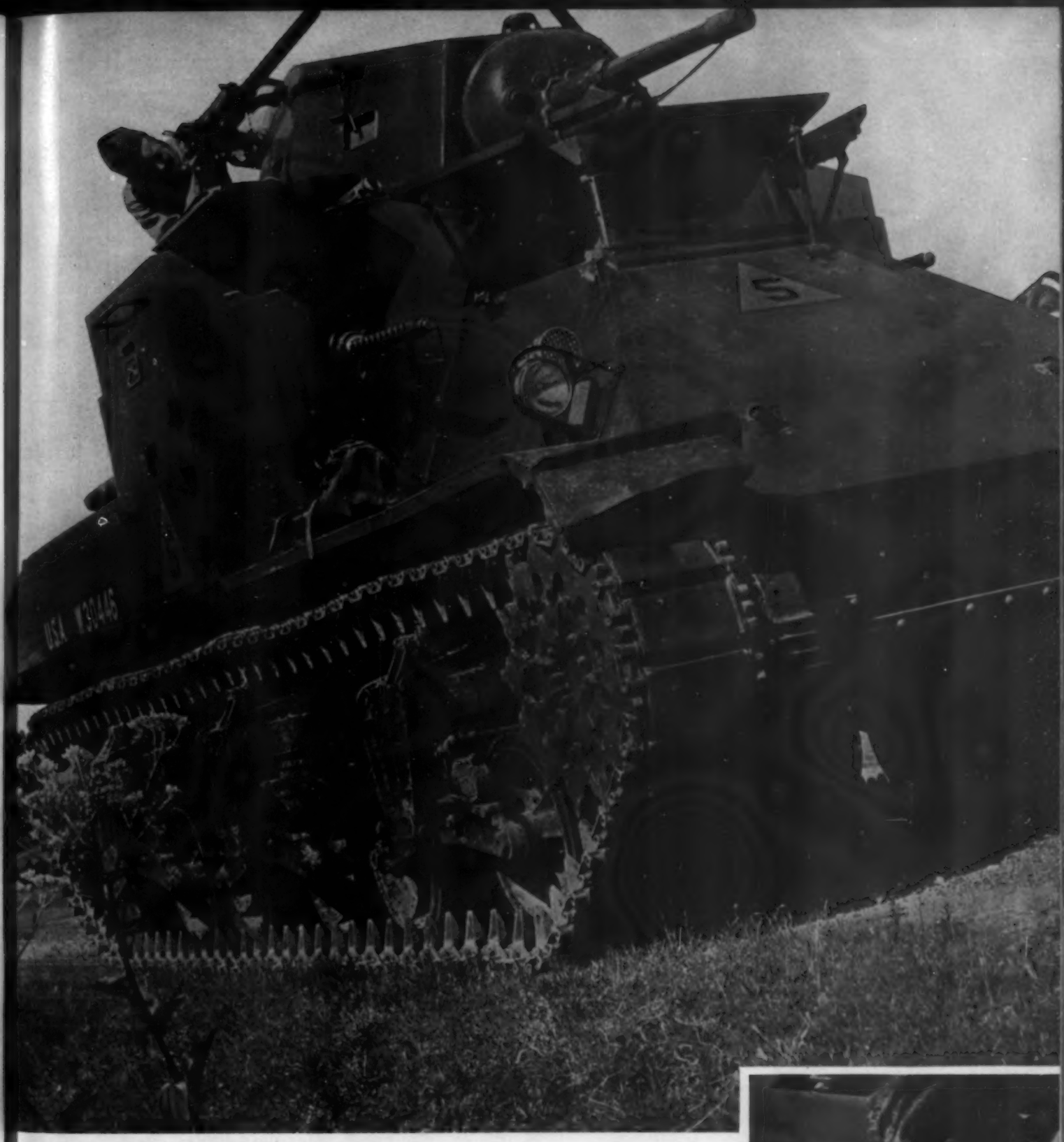


Fig. 1. (Left)—Equilibrium diagram for the iron-chromium-carbon system at 12 per cent chromium (Book of Stainless Steels) shows the increasing solubility of carbon in the gamma phase with rising temperature as shown by the line SE. This is the basis for as-quenched hardness control method described here. Below, left to right, Fig. 2—Micrograph of steel containing 0.37 per cent carbon, 12.6 per cent chromium, as received in the annealed condition, shown at 1000 diameters. Note the preponderance of spheroids of the iron-chromium carbide phase. Fig. 3—Same steel as in Fig. 2 but this sample has been hardened by quenching after heating one hour at 1560 degrees Fahr. The beginning of the progressive solution of the carbide spheroids is shown here. Fig. 4—Same steel as in Fig. 2 but quenched from 1650 degrees Fahr. All micrograph specimens prepared with an etchant of 1 per cent picral plus 5 per cent hydrochloric acid and shown at 1000 diameters. Fig. 5—Same steel as in Fig. 2 but quenched from 1740 degrees Fahr.





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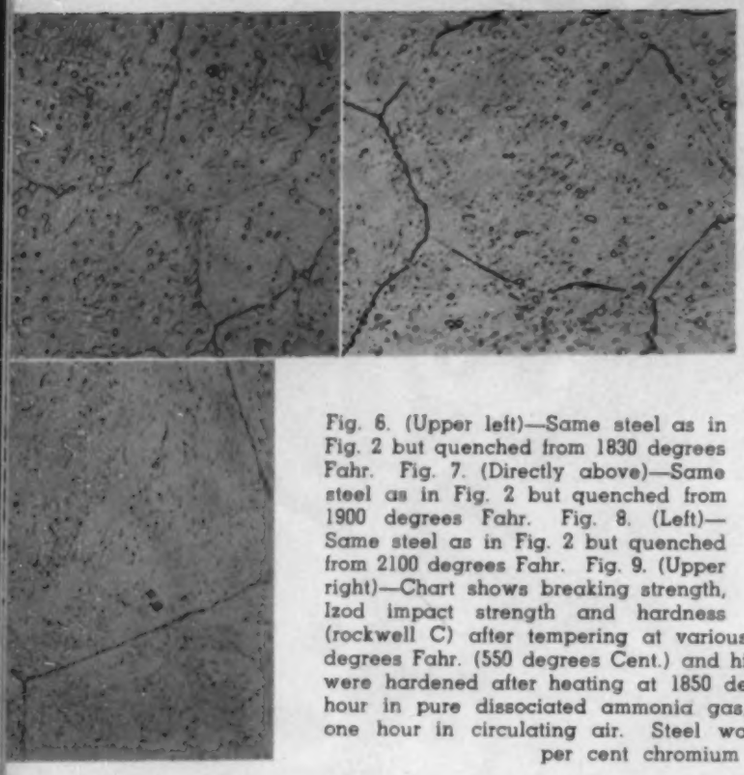


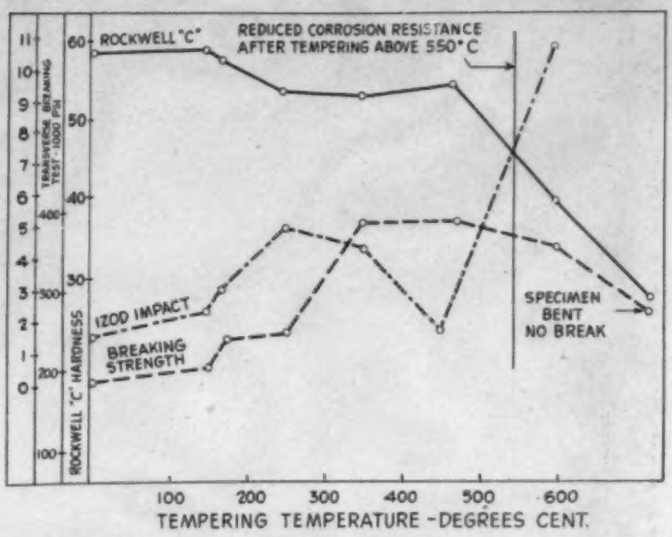


Fig. 6. (Upper left)—Same steel as in Fig. 2 but quenched from 1830 degrees Fahr. Fig. 7. (Directly above)—Same steel as in Fig. 2 but quenched from 1900 degrees Fahr. Fig. 8. (Left)—Same steel as in Fig. 2 but quenched from 2100 degrees Fahr. Fig. 9. (Upper right)—Chart shows breaking strength, Izod impact strength and hardness (rockwell C) after tempering at various values up to 1020 degrees Fahr. (550 degrees Cent.) and higher. All specimens were hardened after heating at 1850 degrees Fahr. for one hour in pure dissociated ammonia gas, then tempered for one hour in circulating air. Steel was 0.37 carbon, 12.6 per cent chromium

ness did not increase further but dropped slightly.

Effect of Time at Temperature: It is important to observe the rate of solution of the chromium carbides for a given temperature. This influence was evaluated by holding specimens of two steels at 1850 degrees Fahr. for periods varying from 10 to 120 minutes. As shown in Table I, the solution of carbides was essentially complete after heating for 10 minutes at this temperature. Consequently, beyond a certain minimum time of the order of 10 minutes for small pieces, time at temperature has little effect upon the as-quenched hardness.

Control of Hardness: The above results seem to provide a workable means of controlling hardness, particularly in the hardness range from 45 to 60 rockwell C. The method is exceptional in that it requires only careful control of quenching temperature. So long as the carbon content is above a minimum value of about 0.25 per cent, the hardness obtained will be a controllable function of the quenching temperature for most practical purposes.

With carbon contents falling below 0.25 per cent, hardness can still be controlled by adjusting the quenching temperature, but the hardness range becomes more limited with the lower carbon contents. Maximum hardness that can be obtained in steels of this type is directly dependent upon the carbon content.

Tempering May Still Be Necessary: Although the method described is more satisfactory for controlling hardness of these martensitic stainless steels than conventional tempering treatment following quenching, quite often other factors such as internal stresses and aging phenomena may require that the work be tempered.

To evaluate internal stresses remaining after hardening by quenching, use was made of a transverse breaking test. Square bars, 0.25 x 0.25 x 2½ inches, were prepared from a steel containing 0.37 per cent carbon, 12.6 per cent chromium. After heat treatment, they were supported on hardened ¾-inch diameter rolls spaced 2 inches apart. Using the brinell hardness tester, the bars were loaded in increments at the midpoint until fracture occurred. The maximum tensile fiber stress was calculated by the simple beam formula from the breaking load read on the previously calibrated dial gage. This test is applicable to those specimens whose hardness is such that fracture occurs with negligible plastic deformation.

Fig. 9 shows the variation in transverse breaking strength through the entire tempering range. Note that the breaking strength rises from 189,000 pounds per square inch with no temper, to 396,000 pounds per square inch after tempering at 660 degrees Fahr.—more than double.

Breaking-strength tests were made of two specimens of 0.37 per cent carbon, 12.6 per cent chromium steel—both hardened to the same final hardness value but by different heat treatments. The first was held for one hour at 1760 degrees Fahr. in pure dissociated ammonia, then quenched directly to a hardness of 53 rockwell C without any tempering. Resulting breaking stress was 325,000 pounds per square inch.

The second specimen was held for one hour at 1850 degrees Fahr. in pure dissociated ammonia and fully hardened, subsequently being tempered to 53 rockwell C by tempering one hour at 660 degrees Fahr. The resulting breaking strength was 390,000 pounds per square inch, 65,000 higher than the first. It is felt this difference in breaking strength is ascribable directly to the residual hardening stresses, since most of these were removed from the second specimen by the tempering operation.

The 65,000 pounds per square inch difference thus represents the residual stresses after hardening, a relative low effective value for residual stresses. Note that it represents the combined effect of the orderly Heyn (macroscopic) stresses and the microscopic stresses.

Impact Strength: Fig. 9 shows the results of impact tests carried out to determine the tempering temperature at which the maximum impact strength could be developed after hardening from 1850 degrees Fahr. Standard 0.394-inch square 3-notch Izod test bars were prepared before heat treatment from steel containing the 0.37 per cent carbon, 12.6 per cent chromium.

Note the minimum value in the

(*Please turn to Page* 121)

TABLE I: Effect of Time at Temperature Upon Quenched Hardness

(All tests were at 1850 degrees Fahr.)

Minutes at Temperature	Rockwell "C" Hardness* Steel 1†	Steel 2‡
10	56-57	56-57
30	57-58	56-57
60	57-58	57-58
120	57-57	57-58

*Values reported give the range for four impressions.

†Carbon, 0.3 per cent; chromium, 12.6; manganese, 0.28; nickel, 0.08; phosphorus, 0.012; silicon, 0.32.

‡Carbon, 0.64 per cent; chromium, 16.2; manganese, 0.24; nickel 0.18; phosphorus, 0.024; silicon, 0.06.

O E M Photo by Palmer, in an Allegheny Ludlum plant

STEEL IS FLOWING TODAY THAT WILL BE FLYING NEXT MONTH

Alloy steel, conceived in the mighty heat of electric furnace arcs, is just being born when it teems into ingot molds.

How soon can the raw steel in those ingots be brought to maturity as parts in finished warplanes (or tanks, guns, ships, munitions)? How much of it can be actually put to work, with only a bare minimum of scrap, "reject" and spoilage losses? In this war, a battle easily may hang on the way any one plant handles its problems of production and conservation.

The Allegheny Ludlum line-up of alloy war-steels includes stainless and heat resistant, tool, valve, nitriding and electrical steels. Information on their more effective fabrication and use includes certified "Blue Sheets" for engineers and technical men; "Handbook of Special Steels" for production men; "Elementary Discussions" of tool and stainless steels for training course use, etc.

● Tell us your alloy steel problems —particularly if yours is a converted plant, making unfamiliar products from strange materials. If we don't have the answers in printed form, the services of our Technical and Field Staffs are also at your disposal.

Allegheny Ludlum
STEEL CORPORATION
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

From Suggestion to Test—In Twelve Days

LONDON

Indicative of the part welding is playing in today's world affairs is the recent record of a workshop in the English Midlands which, in twelve days, succeeded in producing an anti-aircraft gun platform of arc welded sheet metal so simplified in design that it was accepted as standard by the government.

In making the suggestion to the government, the concern promised to turn out a test platform in 14 days. But after four draftsmen, working with the chief designer, produced the drawings overnight—and the day and night construction that went on from there—the components were ready for assembly in 10 days.

Two days later the completed platform was towed off for test. Results of the tests succeeded in obtaining official acceptance of the unit as standard within a month.

Original design of the same platform consisted of riveted construction of rolled steel sections, demanding many man-hours to make.

Publishes 228-Page Book On Cold Finished Steels

Cold Finished Bar Steels is the title of a 228-page volume just issued by Bliss & Laughlin Inc., Harvey, Ill., and Buffalo, N. Y., in connection with this company's fiftieth anniversary. It is crammed with information of interest and value to users of cold finished bars.

Chapters 1 and 2 are devoted to a detailed, illustrated description of operations involved in the production of cold drawn, turned and polished, drawn, ground and polished and turned, ground and polished steels. The functions of the laboratory are set forth, and the operations of inspection, marking and packaging and shipping are explained.

Chapter 3 contains a glossary of technical terminology used both in steelmaking and in processing of steel. It includes charts for classifying steel according to grain size, together with a discussion of the significance of grain size. Other subjects covered are machinability of cold finished steels, heat treatment of such steels and their applications for industrial purposes.

Chapter 4, comprising 80 pages, is devoted to hardness test data, analyses of microstructures, temperature and measurement conversion tables, areas and circumferences of circles, revolutions of spindles per minute, a tap drill chart, coarse and fine-thread tables, data on etching solutions and much other material of this type.

CONVERTERS

Can Expand Steel Production For Castings

WIDENING of the bottleneck in steel castings production and utilization of an untapped source of experienced labor by allowing wider use of steel produced by the cupola-converter method was suggested recently by C. E. Sims and F. B. Dahle, research metallurgists of Battelle Memorial Institute, Columbus, O., at the annual meeting of American Society for Testing Materials at Atlantic City.

Rapid expansion of side-blow converter steel production to meet the unprecedented demand for steel castings can be achieved by the cupola-converter combination. This method, a modification of the bessemer process, Mr. Sims pointed out, has the further advantage that many of the cupolas are already available.

The average annual production of gray iron foundries is 10,000,000 tons of finished castings. Numerous foundries have been forced to discontinue manufacture of plumbing goods, cylinder blocks, stoves, and their other normal products. This makes available not only cupolas, but plants for conversion, fully equipped with sand-handling and molding facilities and crews of molders. Although not experienced in steel casting, they can learn the proper technique faster than green men.

Cast steel is being used for airplane landing gears, gun mounts, tanks and other ordnance material. Much welding and riveting is eliminated, and less metal is required. Cast steel armor plate has stood up well under ballistic tests.

Early bessemer steel was relatively impure and unrefined and therefore inferior in some engineering qualities. By use of the modern cupola with the converter, cast steel can be made to the same chemical composition as acid open hearth or acid electric cast steel. Data presented before the ASTM meeting by Mr. Sims and Mr. Dahle prove that properly made converter steel has engineering qualities on a par with other steels.

The electric furnace was introduced to the foundries of the United States in 1909 at a time when crucible steel was relatively expensive and the converter was almost the only producing medium open to the small jobbing foundry. The converter reached peak production in 1918 with 180,000 tons, but by 1919 the electric furnace had passed it. By 1930 the converter had fallen to a production of 16,500 tons.

Some converter shops have remained in continuous operation, and these have experienced no trouble in meeting ordinary commercial specifications. In England, a land of relatively small foundries, the converter was reported in 1936 to be still the most widely used unit for steel making in the foundry.

Early converter steel was conceded to be impure, with high contents of phosphorus, and nitrogen. Today soda ash treatment of molton cast iron for sulphur removal is developed to such a state that sulphur specifications can be readily met with converter steel. High phosphorus content can be brought within bounds by a ladle treatment with a basic, oxidizing slag. Such treatments have been only recently developed but are proving successful in operation.

Control of the metal composition charged to the converter and control of operation, such as provided by the photoelectric cell, keep the nitrogen content to a minimum.

Of the various steels studied by the Batelle metallurgists, the basic open-hearth steels had lowest phosphorus contents. Without proper indentification, it would be difficult to decide from their properties by what process the others were made.

Mr. Sims' and Mr. Dahle's data showed that the room temperature mechanical properties of all the types of steel tested were entirely orthodox for grade B cast steel and varied with the composition and type of inclusions, without regard to the method of manufacture.

Low temperature impact properties were found to be dependent upon deoxidation practice without relation to process of manufacture. Where low-temperature toughness is required, as for example in mobile equipment used in cold climates, Mr. Sims suggested that the steel be subjected to performance tests and judged on its merits, not on method of manufacture.

The Sims-Dahle report was based on a research investigation conducted in the laboratories of Battelle Memorial Institute and was sponsored by the Whiting Corp.

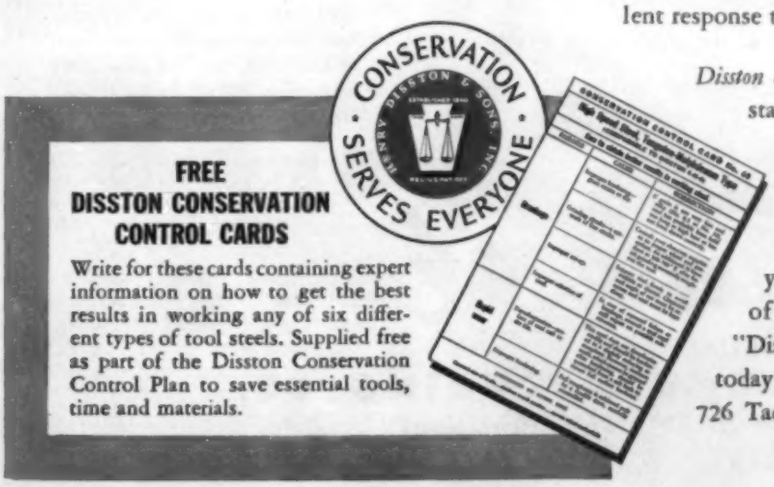
DISSTON SPECIALIZES IN FINE TOOL STEELS

Better tool steels have been the goal of Disston manufacturing effort for 87 years. Beginning in 1855 with the first crucible saw steel ever made in the United States, pioneering again in 1906 with America's first commercial heat of electric steel—Disston has consistently sought new and better ways of improving practice and product.

Modern electric furnaces make Disston tool steel today. Only the purest obtainable materials are used. Scrap is carefully segregated—the most accurate metallurgical and chemical controls are employed—casting, forging and rolling are expertly, skillfully supervised.

By being able to hold operations within extremely close limits, Disston can produce extraordinarily sound and clean alloy and carbon steels with predetermined grain size—to precise specifications. For example, Disston 6-N-6 High Speed Steel—an exceptional high speed steel combining unusual toughness and remarkable wear resistance and having an excellent response to heat treatment.

Disston engineers at your service: Our technical staff will help you select the most suitable tool steels for the job you have to do—to see that you get the best possible service and longest life from each tool . . . And if you do not have your *free* copy of the illustrated, 73-page book, "Disston Tool Steels" write for it today to Henry Disston & Sons, Inc., 726 Tacony, Philadelphia, Pa., U. S. A.



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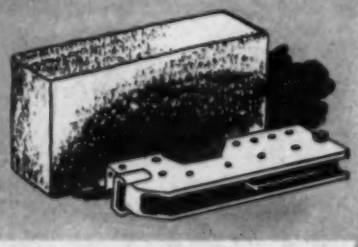
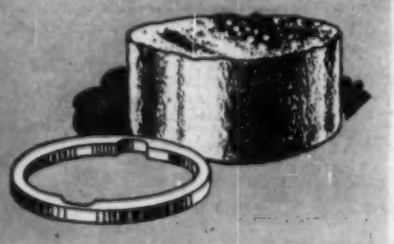


Feed-trough for airplane cannon. Cut from bar of solid steel weighing about 50 lbs. Finished part, illustrated, weighs but 1 lb.



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JOSEPH J. CHENEY, *President*

10 HOWARD STREET ★ BUFFALO, NEW YORK

CRANE CAB AIR-CONDITIONERS

Now Highly Developed

CONTRARY to the impression that might be obtained from the article on p. 102, June 15 issue, of STEEL, the air-conditioning of crane cabs has long passed the experimental stage, and standard equipment has been developed especially to meet the unusually high ambient temperatures and lack of continuous water supply that are encountered on these jobs.

Already one company Lintern Corp., Berea, O., has eight standard models available, suited to all types of metal handling cranes. The units not only provide complete cooling facilities but air filtering and ventilation as well. This equipment has been developed for a number of years to answer the needs of those wide awake managements that realize the immense benefits obtained from speedy, sure handling of ladles, molds, ingots and slabs, rather than the fumbling, half blinded, ineffective efforts of the exposed operator in the old style cab.

Best of all, such modern air-conditioning systems can be installed in old cabs as well as new for the equipment only occupies 1 square foot of floor space in the cab, as is shown in the accompanying illustration of a typical installation. Existing crane cabs can be enclosed inexpensively with windows of the usual type and size. Consequently signaling is carried on in the usual manner without special facilities. When mandatory, a window may be left open for signaling, although this would require a conditioner of larger capacity, of course.

Such units are in daily use in steel mills, foundries and forge shops, operating with complete satisfaction in ambient temperatures up to 165 degrees Fahr. and down to 10 degrees below zero, tempering the air to 90 degrees in summer and to 70 degrees in winter.

Since lowering the temperature alone is not sufficient to safeguard the health and comfort of the operator, filters are included in the equipment to remove dust, and ventilation is supplied to remove noxious gases.

The problem of operating the condenser unit at normal head and line pressures at high atmospheric temperatures encountered over soaking pits, ladles, etc., is met through the use of an evaporative condenser using water carried in a storage tank. Water is pumped from the tank and sprayed over the condenser coil, dissipating the high temperature through water evaporation. Excess water passes back into storage tank. It is only necessary to fill the storage tank through a detachable connection at the landing platform at intervals of 8 hours or more.

Since crane cabs are usually somewhat crowded with operating controls, only a duct is located in the cab, the remainder of the air-conditioning equipment being mounted either on the bridgewalk or on a platform attached to the trolley in the case of stripper or pit cranes. There the equipment is easily available for servicing and allows close coupled refrigeration lines. There, too, relatively cool air is obtainable, lowering the load on the cooling equipment.

A typical installation shown in the accompanying illustration has the filter-blower assembly located at A, the filters removing all dust, dirt and fumes from the air. The clean air is then drawn through the cooling or evaporator coil, where its temperature is reduced. Next a blower forces the air through the duct B into the cab at D, where it is diffused without draft. The evaporator coil operates in a closed Freon mechanical refrigeration circuit, with condenser unit E ordinarily located in close proximity to the filter-blower unit A.

In winter, heating often is required, so an electric heater is built in the equipment at E. It makes the conditioner effective 365 days of the year. Heat is delivered at floor level. Whether heating or cooling, sufficient pressure is maintained in the cab to prevent entrance of fumes or gases.

It should be emphasized that while the design of the conditioner as a whole is special, the motor, compressor and automatic control are of standard and proved design, including the thermostat which functions without any special care or attention. Deliveries are currently possible, and spare parts always available.

Such conditioners made by the Lintern Corp. are being installed on existing cranes (without delaying position) in New England, Pittsburgh, Chicago, Texas and the far west.

Many crane manufacturers are putting them on a major portion of the hot-metal cranes being built, for they are regarded as a protection to the health and comfort of the crane operator that returns the investment quickly through elimination of relief men in full utilization of the time of those trained and capable men available.

Typical installation of a Lintern-Aire conditioner in the cab of an overhead crane such as is used to handle hot metal in steel mills. Filter-blower assembly is at "A", condenser unit at E, cooling coil at A. Duct B carries clean cool air to cab at D where it is diffused without draft. Note only 1 square foot of floor space is required by duct in cab, the air-conditioning equipment being mounted on crane walkway above

WHY NOT INCREASE ARC SPEEDS NOW???

(How To Get the Most from Arc Welding—Section 13)

By E. W. P. SMITH
Consulting Engineer
Lincoln Electric Co.
Cleveland

POSSIBILITIES of more effective utilization of man power in our war effort are exemplified in the greatly increased welding production that can be obtained by increasing arc speeds, the rate of travelling the arc along the seam being welded.

This brings up the matter of unused or dormant abilities that lie within every welding operator. Many operators, supervisors and engineers working in different parts of the country have discussed this in group meetings of different types, so the writer has been able to obtain the benefits of a wide range of experiences. On the basis of arc speed only (that is, following a seam with no dragging of the electrode but keeping the arc in operation), opinions expressed indicated that it should be possible to obtain ultimate speeds of the order of 3600 feet per hour.

On first thought, this may seem excessive. But take a pencil. Trace the length of the long edge of an ordinary letterhead laid on a table. If you can follow this line while saying rather deliberately "one chimpanzee", the speed is about 3600 feet per hour. And you will realize that as far as mechanical ability to follow the seam is concerned, 3600 feet per hour should be all within the realm of possibility.

The fact that almost any arc welding operator thus is capable of following a seam with his electrode at a rate around 3600 feet per hour indicates that there are potential welding speeds much in excess of usual manual arc welding speeds, which seldom exceed 100 feet per hour. And much welding at present is done at rates far below that value.

For example, welding handbooks show an arc speed (rate of electrode travel) of only 4 feet per hour when making an overhead butt weld in ⅛-inch plate with 3/16-inch rod. Of course this largely is a type of weld tedious to make, because the speed is limited by position. On the other hand, one of the fastest arc speeds listed is 200 feet per hour, a rate employed in making a lap weld in 3/16-inch plate in a flat position using a ¼-inch rod. This is recognized and labeled as a high-speed weld. Of course various applications and types of joints are listed with expected arc speeds throughout this entire range of 4 to 200 feet per hour.

However, if the operator can move an electrode over a joint at a rate approaching 3600 feet per hour, there are vast possibilities to be developed. Granted that there are problems in procedure, much higher welding speeds should be possible.

That some thought has already been given to this problem of increasing manual arc welding speeds is evident from the fact that some few jobs are already in operation at double or triple usual speeds, one job being done at the rate of 500 feet per hour. As far as is known, this is the fastest rate attained in any shop at the present time. This particular job consists in welding hollow rectangular table legs made from 18-gage steel sheet. A fixture is provided which holds the joint edges precisely in position against a copper backing strip in such a manner that the weld metal can simply be poured in to the bead which forms the corner weld here.

In addition to being positioned in the manner shown below, the work is tilted. The direction of electrode travel is down to help control the flow of deposited metal. This joint is made at an arc speed of 500 feet per minute by manual arc welding, a 3/32-inch electrode being employed at 100 to 125 amperes welding current with 40 volts across the arc. The electrode is a heavily shielded type.

Some will claim that it is impossible to follow a seam at such high speeds and produce a good-looking joint. However, the work being turned out at the installation just described is excellent. Obviously it is a matter of skill—just as most of us who drive a car 60 miles an hour when conditions are suitable dare not drive over 100 miles per hour even though car, road and traffic conditions permit. On the other hand, experts drive more than 300 miles per hour.

The question of whether or not the operator can follow a seam at high speeds thus narrows down to a matter of skill and whether or not the conditions for moving the electrode at these speeds have been set up properly. However, as will be explained below, any welding engineer can calculate the arc speeds which should be obtained on any job by a simple formula. In practically all cases, the arc speed that should be had according to the formula will be found anywhere from 1½ to 3 times present actual speeds, indicating great possibilities of faster welding.

Thus within the limits of present welding equipment it is entirely possible to increase welding speeds anywhere from 1½ to 3 times on the average application.

The reason for this is that the amount of bead, welding current, arc voltage and arc speed are all relative factors. Thus it is possible to step up the arc speed if the other factors are stepped up in the correct proportion.

The formula mentioned for calculating the arc speed which should be attained involves a simple arithmetical relation as follows: Arc speed in feet per hour equals 0.2 of the arc kilowatt that are now being consumed (arc voltage times arc current divided by 1000) divided by the cross sectional area of the *deposited* metal in square inches. This latter figure must be obtained

This is the setup in which an arc speed of 500 feet per minute is obtained by manual arc welding

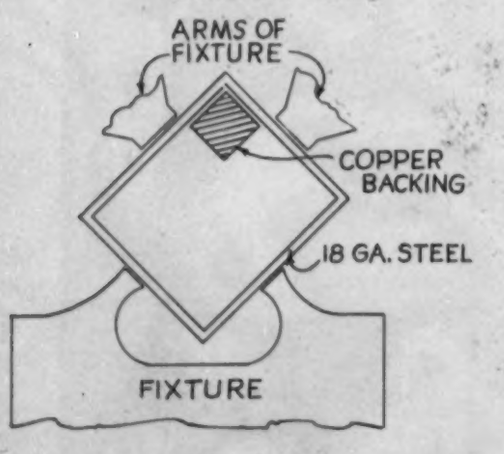

TABLE I—Relation Between Kilowatt-Hours at the Arc and Consumption of Electrode in Pounds per Hour

Electrode Size	Arc Amperes	Arc Volts	KWH Per Hour	Consumption Lbs. Per Hour
5/32	110	24	2.64	2.60
3/16	130	25	3.25	3.30
7/32	150	26	3.90	3.95
¼	250	30	7.50	7.50
5/16	325	34	11.10	10.70
⅜	425	38	16.10	16.20

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TABLE II—Effect in Man-Hours of Changing to Larger Electrode

Electrode Diameter, Inch	Percentage of jobs done with next larger size electrode				
	0%	25%	50%	75%	100%
1/8	21,400,000	20,330,000	19,170,000	18,060,000	16,900,000
5/32	41,650,000	39,785,000	37,770,000	36,155,000	34,340,000
3/16	39,700,000	35,030,000	30,450,000	25,875,000	21,200,000
1/4	10,300,000	9,500,000	8,720,000	7,970,000	7,200,000
Total	113,050,000	104,645,000	96,110,000	88,060,000	79,640,000
Decrease	...	8,405,000	16,940,000	24,990,000	33,410,000
Operators available	...	4,200	8,470	12,495	16,700

by actual measure for an accurate average value must be used to obtain the correct results. This formula is true for any type of electrode, any type of joint in any type of base metal within 15 per cent. It is based on burning off from the electrode 1 pound of metal for each kilowatt-hour of power consumed at the arc. It also allows for spatter loss and vaporization by figuring that only 2/3 of this pound is actually deposited as weld metal. Thus a ¼-inch electrode, operated at 250 amperes with 30 volts across the arc will consume electric power at a rate of 7.5 kilowatts per hour and consume electrode at a rate of 7.5 pounds per hour.

Now let's see what is involved in increasing the arc speed—that is, the speed at which the welder traverses the joint with his electrode. Assuming that the size of the bead is not changed, if we move the arc along the bead faster, metal must be melted off the end of the electrode at a faster rate. To do this requires more power at the arc—in other words, more kilowatts will be consumed at the arc in a given length of time. This means that the product of the volts times the amperes must be greater. Since for a given type of electrode the drop across the arc or the arc voltage is approximately constant over a considerable current range, this means that to get more power into the arc, the welding current must be stepped up. This in turn means that the current setting on the welding machine must be raised.

However, there is another factor involved, for it is not practicable to use the same diameter electrode and simply increase the welding current to get faster deposition because there is a certain range of consumption rate in which any particular size of electrode must be operated to deposit metal efficiently without excessive loss from splatter and vaporization.

Results of these limiting conditions is that for each current range there is an electrode size whose optimum burn-off rate comes within that range. Thus if you wish to melt off metal faster in order to move the electrode along the bead faster, it becomes necessary to go to a larger rod, for the larger rod will deposit more metal in direct ratio to its cross sectional area if the rate of consumption (in. per min.) is the same.

There is another factor involved also, and that is the time lost in changing electrodes. If we are going to move the electrode faster and deposit more metal in a given time, more electrodes will be consumed and a larger percentage of operating time will be lost in changing electrodes. This also indicates the necessity for using large-diameter electrodes and maximum lengths available.

The matter of electrode length also determines the number of craters involved in laying down a given volume of weld metal, for the shorter the electrode, the more it will be necessary to interrupt the weld to change electrodes, thus producing more craters. Electrodes should be 14 inches or longer in all instances, and the 18-inch length is to be recommended in some cases.

Can using higher welding currents and larger electrodes be significant in the present emergency? Consider these figures: An estimate places electrode consumption for 1941 at 315,643,000 pounds, about 80 per cent of which was in electrodes of ¼-inch diameter or smaller. Of this volume, 13 per cent was in ⅛-inch rod, 32 per cent in 5/32-inch rod, 37 per cent in 3/16-inch rod and 18 per cent in ¼-inch rod. Of the total consumed then, some 32,825,000 pounds was in ⅛-inch electrode; 80,800,000 pounds in 5/32-inch; 93,425,000 pounds in 3/16-inch; and 45,450,000 pounds in the ¼-inch size.

On the usual 14-inch length of electrode, there is a 2-inch stub end loss, which amounts to about 15 per cent. Deducting this leaves for actual consumption 27,901,250 pounds of ⅛-inch electrode; 68,680,000 pounds of 5/32-inch; 79,411,250

Iron Mirror Supports Huge Rotor

TWO MILLION pounds of rotating machinery in a 108,000-kilovolt-ampere Westinghouse vertical waterwheel generator for Grand Coulee will be supported by this giant cast iron mirror. Weighing 9700 pounds, this shiny thrust runner plate is 8 feet in diameter, 6 inches thick and has a 38-inch bore. It will support the generator rotor, waterwheel propeller and shaft. The finish resulted from completely machining, lapping with abrasive compound and polishing

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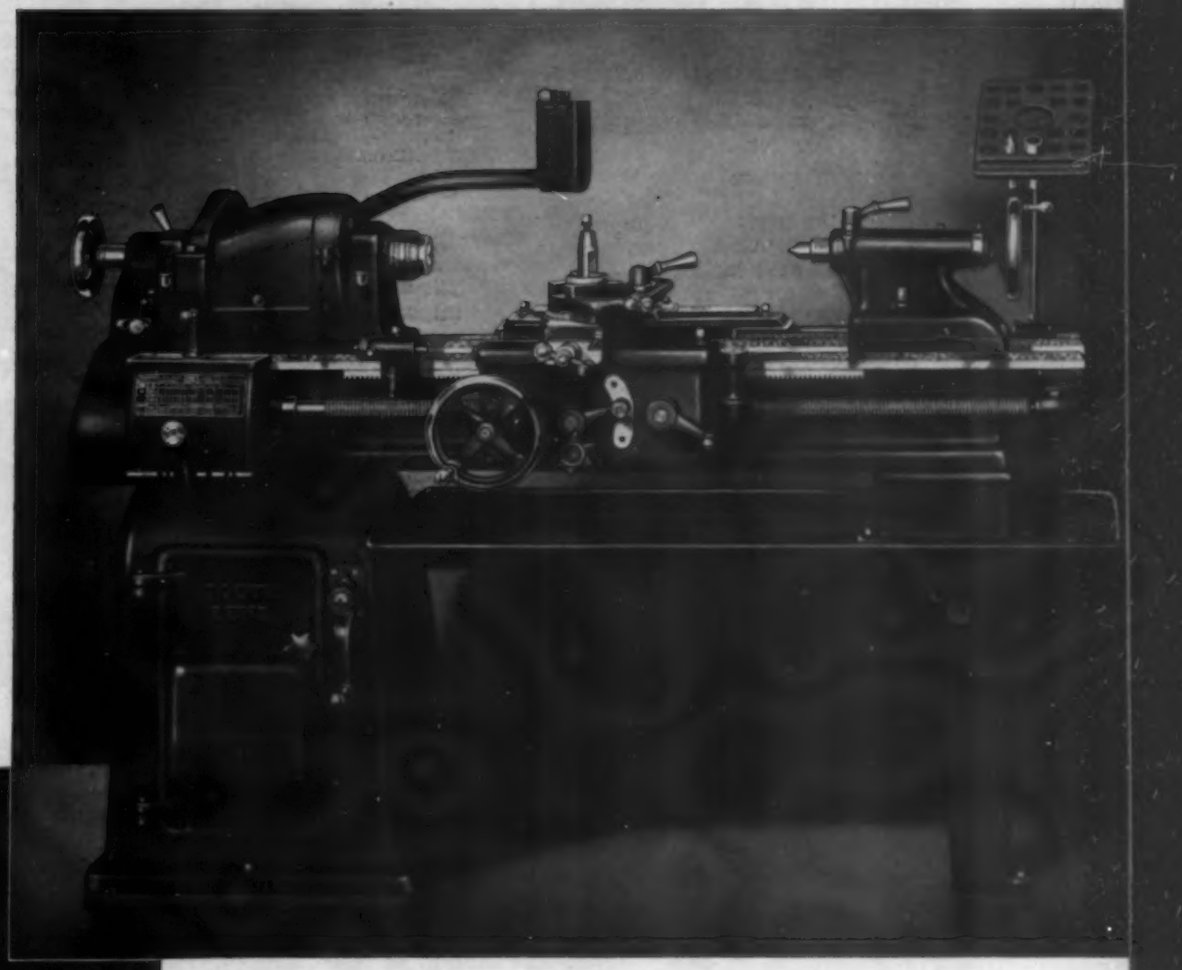

13″ x 5′ South Bend Underneath Motor Driven Tool Room Lathe.

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pounds of 3/16-inch; and 38,632,500 pounds of the ¼-inch.

On the basis of usual good practice, with a 50 per cent operating factor, the actual consumption rate would be 1.3 pounds per hour for ⅛-inch electrodes, 1.65 for 5/32-inch 1.95 for the 3/16-inch, and 3.75 for the ¼-inch.

Now dividing the pounds available for consumption by the rate of deposition gives 21,400,000 manhours employed in depositing ⅛-inch electrode; 41,650,000 for 5/32-inch; 39,700,000 for 3/16-inch and 10,300,000 for the ¼-inch.

Now consider the saving in manhours that could be obtained merely by shifting to the next larger size electrode and its correspondingly higher current. Referring to Table II, note the effect of changing 25 per cent, 50 per cent, 75 per cent and 100 per cent of the jobs now using a given type electrode over to the next larger size. In many cases it will be possible to change to two sizes larger, which of course would produce a correspondingly greater saving.

A study of the figures in Table II reveals the great time savings increased production of guns, ships merely by going to the next size larger electrode. It is not unreasonable to say that 75 per cent of all welding jobs could be done with one size larger electrodes, but a figure of 50 per cent will be employed to be conservative. *On this basis, the time saved would make available almost* 8500 *trained welding operators for other and additional work.* At the present emergency with war production demanding more and more trained operators, the availability of such skilled men is highly important.

Use of the larger electrodes also permits a joint to be completed with a smaller number of passes and so with less distortion. Thus time saving is obtained along with better fabrication.

To utilize fully the benefits from employing large electrodes and high welding currents with fast arc speeds, a joint should be positioned so the "fluid" type of electrode can be utilized and the weld metal simply poured into the joint. Positioning or placing the joint in the most favorable position for welding is of two general types—static and moving.

Simply changing the work to a position for downhand welding may permit an increase of as much as 100 per cent in the speed of deposition. The economic advantages are obvious.

TABLE III—A Highly Weldable Steel, Suited to High-Speed Welding

	Recommended Value, Per Cent	Limits, Per Cent
Carbon	0.17	0.15-0.25
Manganese	0.45	0.35-0.60
Silicon	0.05	0.07 max.
Sulphur	Low	0.05 max.
Phosphorous	Low	0.045 max.
Aluminum	Not over 2 ounces per ton added unless semi-killed with silicon, in which case aluminum should be as low as practical—from 0.04 to 0.07% silicon.	

On work that cannot be moved about to position it for welding, it thus becomes important for the designer to give careful thought to layout and assembly of the work so the welding operator may be able to take full advantage of the highest possible welding speed by having the joints of a type easy to weld in the position in which they are found in the structure. As an example, the selection of a joint as a fillet may be made so as to obtain a flat fillet in one case and overhead type in another. Once the designer has made the decision and laid out the work for that type of joint, the shop has no alternative but to follow his design. Thus welding speed begins on the drafting board.

Also important in making it possible to utilize high speeds is the matter of moving or turning over the work for best welding position —called "positioning" as against "position", in which the joint must be welded where the work cannot be moved about. For example, a joint normally horizontal may be made flat merely by turning the parts 90 degrees. In the case of a girth seam in a tank, the tank can be rotated, thus allowing the entire girth seam to be made in the flat or downhand welding position as the joint passes underneath the electrode. All these increase welding speed.

The welding equipment itself must be selected for high-speed operation for older types of welding generators will not produce as high deposition speeds as will the newer types with their better operating characteristics.

Selection of Material: While a great many metals and steel alloys can be arc welded satisfactorily, the selection of a material particularly well suited to the welding operation can greatly speed the work.

As an example, in an automatic job where good jigs, fixtures and fitup permit full advantage to be taken of the highest possible speeds, an arc travel of 350 feet per hour was being obtained. Simply by changing the analysis of the steel it was possible to increase this speed to about 600 feet per hour—almost double.

The cost of the new material was not higher, but obviously the cost of the finished article was greatly reduced by the increased welding speed. For a highly weldable steel, see Table III.

Weldability of steel, positioning, electrode size speed of travel influence rate of production. Of these, electrode size and speed of travel are most important.

The operator can do it. He says so himself. The war effort requires greater production. And it can be done on existing production lines NOW.

Hold 80 Points in Alignment While Welding

AN EXAMPLE of effective control of expansion and contraction effects in welded pipe assemblies is demonstrated above in the fabrication of ammonia accumulators at Vilter Mfg. Co., Milwaukee. Here 238 welds are made on each of these assemblies, keeping 80 inlet and outlet points in alignment for connecting the accumulator to the cooling system for which it is intended. Photo by Air Reduction Sales Co., New York

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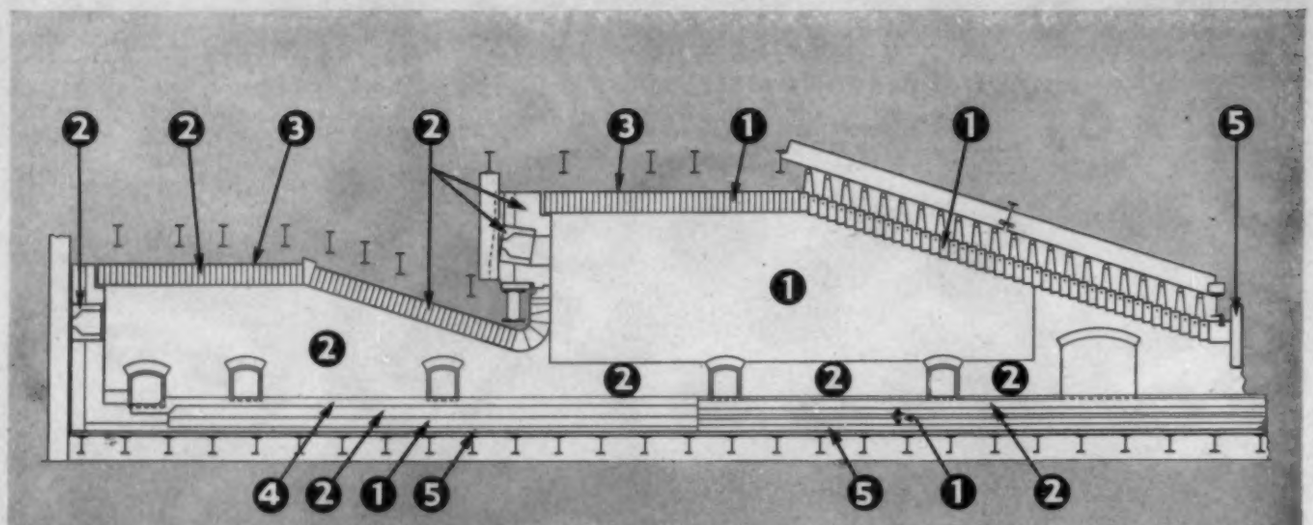

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Recovery and Preparation of STEEL SCRAP

By Fred E. Ullman
Chief Engineer
The Heckett Corp.
Butler, Pa.

(Concluded from last week)

EQUIPMENT used in the recovery of scrap, as described in the first installment, can be operated in confined areas. The transportation facilities are adequate to handle any disposal of the waste and move the recovered steel over any kind of terrain. Due to the fact that the transportation costs do not ordinarily exceed 15 per cent of the total cost of recovery and preparation in the average operations, the stationary preparation unit may be located some distance away from the site of the recovery operation. In all cases this distance varies due to the fact that the recovery equipment is portable and moves, during the course of the recovery job, all over the area occupied by the dump. In cases where adequate power and rail transportation facilities are not available, portable power generation equipment may be employed with slight increase in production cost and trucks may be employed to transport the recovered and prepared steel scrap from the site of the recovery and preparation job to rail transportation facilities or directly to the steel plant.

Present Operations Limited

At present dump recovery operations are limited largely to clean steelmaking furnace slag dumps containing from 12 to 18 per cent of recoverable steel scrap and delivering from 2000 to 3000 tons per month of prepared scrap with each set of equipment described. However, there is no reason why, if the scrap shortage continues, the recovery operations might not be started on dumps containing lower percentages of steel provided steelmakers are willing to pay the price of recovery. In present operations the cost of recovery and preparation ranges between $6 and $9 per gross ton and in dumps containing as low as 6 per cent of recoverable steel the cost might rise above $20 per gross ton. These cost figures depend largely upon labor cost and the physical conditions under which the recovery operation is performed. The preparation cost generally remains constant for all operations.

In analyzing recovery and preparation cost of dump operation it is interesting to note that amortization and maintenance costs are exceptionally high. This condition is due to the fact that standard equipment, such as shovels, tractors, trucks, etc., must be used for this type of work. Steelmaking furnace slags are among the most heavy and abrasive materials known. Accordingly the life of the equipment is considerably shorter than units handling dirt, rock, etc., and maintenance costs are several times those encountered in most other operations.

Stationary Equipment Used

The second general type of recovery and preparation job is the current production operation. This type of operation differs from the dump operation described in that all of the equipment is stationary. In the current production operation the recovery and preparation work is performed upon the slag and refuse being currently produced by the respective steelmaking furnaces. The currently produced slag and refuse are taken from the furnaces to the current production recovery and preparation plant and disposed of in the usual manner by the respective steel plant equipment.

Equipment used in the current production is, with the exception of the separator machine and the cleaning installation, the same type of equipment used today by many of the steel plants for the recovery operations on the steelmaking furnace slag and refuse as they are being performed. Slag and refuse, usually in thimbles and side dump cars respectively, are brought under an overhead crane runway and dumped into a hot slag pit. With a drop ball these materials are broken up in this pit and fed through a separator. Slag and refuse coming out of the slag chute are directed into railroad cars or trucks and removed to the dump. This type of operation necessitates only one bucket handling of the slag and refuse, from the hot slag pit to the separator grizzly, since the cars are reloaded by gravity from the separator slag chute. Slag and refuse which will not pass through the separator are deposited in front of the separator grid in a concentrated pile where they are broken most efficiently with the drop ball. The larger pieces of steel which will not pass through the separator also are concentrated in front of the separator grizzly. In many cases it is necessary to cool the slag with water before feeding it through the separator and this operation aids greatly in breaking up the hot slag. Developments indicate that all of the slag can be broken up in this manner to small sizes which will allow maximum efficiency in bucket operation as well as in separation.

Steel scrap and blast furnace fines recovered by the machine are fed by gravity into storage pits under the runway where the fines may be stored for rerunning through the separator and ultimate shipment to blast furnaces, and where the recovered steel scrap may be picked up directly by a magnet on the crane hook and fed into the cleaning installation.

Where a stock is located near the steel plant the slag coming from the slag chute may be led through a crusher and crushed down to size suitable for use in the blast furnace as a fluxing material. Slag

Flush of molten slag being received by cinder ladle. Any carry-over of iron is recovered at the slag dump

from the thimbles is dumped into a separate part of the hot slag pit in order that it may be fed separately from the pit refuse through the separating unit, crushed, and dropped directly into cars for shipment to the blast furnace.

Crushed slag of this type also could be used for various aggregates. In Europe it has been applied particularly to road building materials because it is structurally stronger than blast furnace slag and will not absorb as much tar, road oil, or asphalt. In the southern steelmaking areas where high-phosphorous open-hearth slags are produced, the slags at present are being used for fertilizer. Steel-free slag can be crushed readily in standard crushing equipment without breakage to the crushers.

At steel plants equipped with overhead cranes on runways under which currently produced slag and refuse is dumped, it is often a relatively simple matter to add the installation of separating and cleaning equipment. The small amount of space occupied under the runways by these units is more than compensated for by the increase of efficiency in the operation of the present equipment. It is also possible to bring other steel containing wastes such as soaking pit scale, rolling mill scale, foundry slag, and foundry sand into a complete current production recovery and preparation plant for the recovery of scrap contained in them. Where production recovery and preparation plants are located in the vicinity of the steelmaking furnaces, the recovered and prepared steel scrap is loaded directly into charging boxes with a resulting saving in time and handling expense.

The cost of the recovery and preparation of steel scrap from the currently produced slag and refuse depends entirely upon the character of the materials being handled. The average loss into slag and refuse at the furnace is between 3 and 6 per cent of the ingot production of the furnace depending largely on the type of furnace and method of operation; 95 per cent of this loss can be recovered by use of the previously described process. The cost to recover and prepare steel scrap contained in these materials may range from $2 to $15 per gross ton.

Reasons for Cost Spread

Many reasons for this wide range are apparent. Where individual steel plants have various types of recovery operations going on, the materials which might be worked through by a current production recovery operation would contain a low percentage of steel with a resulting high cost per ton for recovery and preparation. A number of the steel plants are of relatively small size and are accordingly not producing large quantities of slag and refuse. Since any complete recovery and preparation plant requires equipment of adequate size to effect the complete recovery and preparation job, it may not be necessary to operate the equipment more than five or six hours per day to process the volume produced, and therefore the amortization costs make up a high percentage of the total cost per ton. In adapting special recovery and preparation equipment to present recovery equipment operated by individual steel plants, it is often necessary to make special outlays involving extensive installations of conveying equipment. In general the cost per ton of labor and maintenance in the current production operation makes up a smaller percentage of the total cost per ton due to the fact that less labor is necessary and because the separator machine and the cleaning equipment are especially built to handle the heavy and abrasive materials encountered in this operation.

One of the major objections to the use of steel scrap contained in steelmaking furnace slag and refuse has been its low quality. With the exception of the best quality pit scrap and ladle skulls, the steel scrap lost with the slag in tapping the furnaces contains only approximately 50 per cent steel by weight due to adhering slag. The steel scrap recovered and prepared as described is composed of approximately 85 per cent steel by weight, and the analysis can be raised beyond this point where necessary in special steelmaking operations. Although many steelmakers do not consider steel scrap of 85 per cent metallic content by weight to be a high-quality scrap, present users of the scrap recovered and prepared to this quality indicate that no serious

(*Please turn to Page* 122)

Spun Steel Barrel

EXAMPLE of modern metal fabrication and its application to scientific research is this open-end spun steel barrel recently completed at Milwaukee Metal Spinning Co., Milwaukee, for Ohio State university, department of physics. Ordinarily, these "caps" or barrels, for use as an electrostatic shield for a Van der Graaff electrostatic generator producing X-rays, are spun of copper, but due to war restrictions steel was substituted. The spinning operation demanded extreme care and skill for the harder metal required utmost precision

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BETTER HANDLING SCHEME

. . . . doubles number of engine tests per "cell"

By F. L. SPANGLER

UNCLE SAM must be satisfied with the performance of every aviation engine before it leaves the factory. This means exhaustive tests under prescribed conditions of operation. Each engine is tested in a closed room, known as a test cell, observation and control being in an adjoining room.

Ordinarily, before an engine can be put on test, at least four hours of preliminary preparation is required. And after the test, several more hours are necessary to disconnect wires, hose, exhaust, etc., before the engine can be removed from the test cell. As a result, the test cells, with their expensive and intricate equipment are tied up more than half the time in preparation and dismantling operations.

Each test cell requires an electric generator for loading the engine, an air blast system for cooling, provision for supplying gasoline and lubricant, piping for carburetor air, means for throttle control, and delicate instruments for indicating or recording the test results.

To increase the use of their engine test cells, the Buick aircraft engine plant has devised a means for doing almost all the preliminary work, in preparation for the test, outside the test cell instead of in the cell. After a test is completed, less than half an hour elapses before the next engine is in the cell and completely hooked up ready for the test. With this method, this plant is getting more than 90 per cent use from its test cells. Hence, the flow of engines through each test cell is almost twice as fast as with the conventional method of preparing the

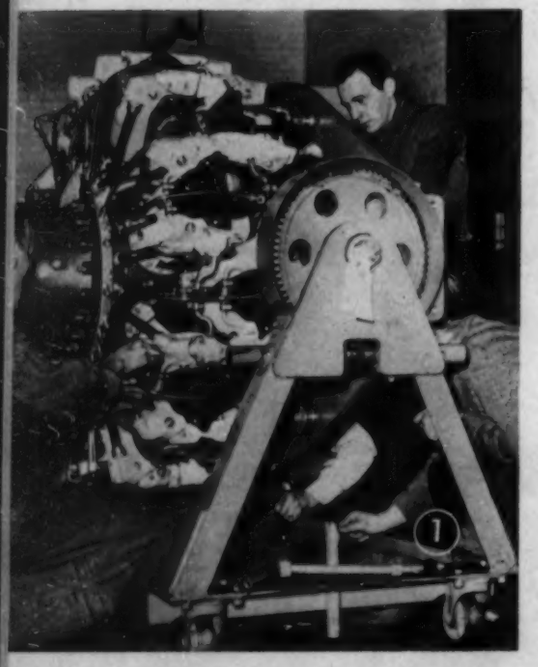


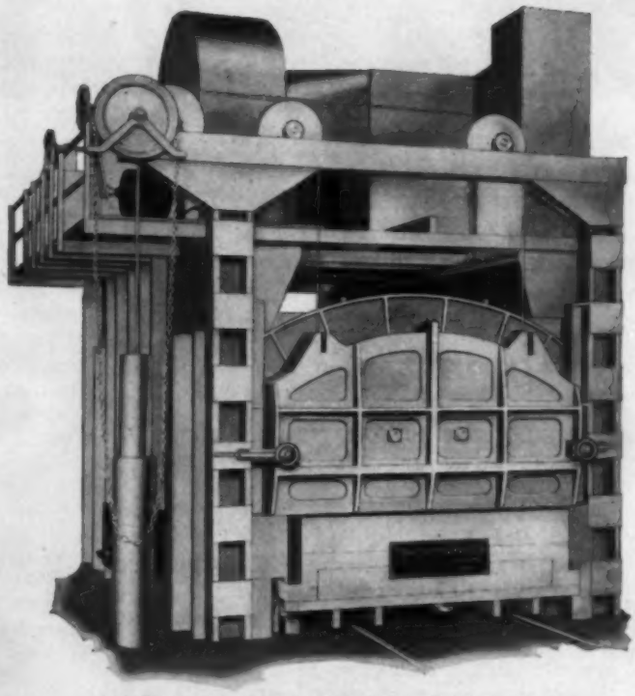
Fig. 1—Big Buick-built aircraft engines come from the assembly lines mounted on these special stands, the wheels of which run in sunken tracks or on special rails to keep the stand traveling in line. A pan is provided to catch any parts that may be dropped during assembly operations. Note worm gear drive on end to rotate engine on the cradle to any angle desired. This facilitates assembly

Fig. 2—Engine is mounted on this special stand, flexible connections attached, ready to be coupled to connections in test cell in short order. Note at lower right, a portion of one of these stands with the engine mount ring clearly visible.

All photos from Buick Motor Division, approved by Army censors

Fig. 3—With all electrical and hose connections attached, shaft coupling and carburetor air piping in place, engine and mount are moved into test cell by special overhead monorail crane. Note monorail employs two beams on traveling bridge, the lower one of which extends into test cell to line up with short section therein. Interlocks prevent trolley running off end of monorail bridge by assuring perfect lineup. Special lifting frame supports engine and mount during moving

HOW DO TANKS GET THAT WAY?



MAHR recirculating air draw-stress relief furnace.

MAHR car bottom Carburizing furnaces for Carburizing armor plate.

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"Well, I never knew that!"

Out of the experience of today, better products tomorrow

NEVER since the birth of the machine age has equipment been asked for such overloads, materials for such performance, and man's brain for such results! Men whose technical knowledge was ample for yesterday, marvel today at what war's drive demands and gets. Though it takes a harsh toll, war *is* a school to those who will learn. Forced out of beaten paths, we are now learning to use many a new method, many a new material. For those who study and record as they do war's work, the future should be rich in opportunities for more beautiful, more efficient, more economical products.

As a study-guide to those now working with Seymour Products, let us emphasize some of their basic qualities—"spring boards" from which future possibilities may be legion!

1. SEYMOUR NICKEL SILVER is an alloy of copper, nickel and zinc. Fine grain, good corrosion resistance and a silvery white color make it an ideal base for silver, nickel and chromium plating. Takes any hardness from dead soft to spring temper. Excellent for deep draws and difficult spinning. Leaded, it machines freely.

2. SEYMOUR PHOSPHOR BRONZE is an alloy of copper, tin and phosphorus. Highly resistant to corrosion, abrasion, friction and fatigue. Springs made of it stand almost indefinite flexure. Practically indifferent to thermal change in most applications. In all ranges of hardness and leaded for machining.

3. SEYMOUR NICKEL ANODES are made of virgin nickel, melted in the electric furnace under pyrometric control and laboratory check. Outstanding is the "Seycast" 99%+ cast nickel anode with radial "anchored" grains that tend to eliminate loose nickel in low pH baths. Designed primarily for Bright Nickel, but will give excellent results in any hot Watts bath having a pH of 4.5 (electrometric) or lower.

4. SEYMOUR BRIGHT NICKEL is an organic plating process free from promoter metal, stable, easily controlled. Utilizes the hot Watts bath and produces brilliant, silvery white deposits over copper and brass, also direct on steel. No coloring required after plating. The work leaves the final rinse with a bright deposit.

SEYMOUR

NON-FERROUS ALLOYS SINCE 1878

THE SEYMOUR MANUFACTURING CO., SEYMOUR, CONN.

Fig. 4—Mounted in test cell, engine is ready for initial test run. At a touch of the starter in the adjoining control room, it will roar into action

Fig. 5—This is a view of the control room and a few of the many instruments and meters employed to afford an accurate measure of the engine performance. A complete log is kept of each test

engine for the test in the cell itself.

The Buick plant is engaged in manufacturing radial aircraft engines. These come from the assembly floor with each engine mounted on a special truck, Fig. 1, that runs on rails laid in the floor. These rails end in a bay running alongside the test cells. After the engines have been delivered to this bay, they are handled by means of a cab-controlled overhead electric traveling crane of special design, Figs. 2 and 3. This crane lifts each engine from the truck and sets it onto a structural frame, Fig. 2, to which it is fastened by means of nine clamps. For lifting the engine a special sling is used, employing two hooks that engage eyes in the top of the engine block.

After the engine is mounted in place on the test frame, the ignition wiring and pyrometer wiring are fastened in position, a special hood for the carburetor air is mounted onto the engine, and a shaft coupling is installed. Gasoline and lubricating-oil hoses are attached, these being provided with quick-fastening couplings. With the preliminary work completed, the crane serving the bay lifts the frame and engine by means of a special rigging provided with four hooks which engage the base of the frame as shown in Fig. 2. The frame, with engine attached, is moved into the test cell, Fig. 3, after the crane has taken out the preceding engine under test. Then the frame is clamped to a steel-and-concrete base on the test cell floor.

With the engine in the test cell, each hose is coupled to its proper connection in the floor, and the electric wiring is plugged into a special multiple-connection receptacle. The hood for the carburetor air is attached to an intake in the floor by means of a quick-fastening coupling. The engine shaft is bolted onto an extension of the generator shaft, and the cooling air duct in front of the engine is opened. Also the throttle is connected to a hydraulic control in the floor, this control being operated from the adjoining control and observation room.

When the engine is ready for testing, the door to the cell is closed. The engine is operated at varying loads while manifold pressure, brake horsepower, fuel consumption, oil temperature, and other readings are taken. Each engine first goes through the "green" test, which requires nine hours, after which it is removed from the test cell and sent back into the plant, where it is torn down and all parts examined. The engine is then reassembled and given another similar test, this one lasting four hours, after which it is ready for shipment.

The crane used for moving the engine and mounting frame into and out of the test cell has a monorail trolley which runs back and forth on a steel beam. When the trolley is directly opposite the test cell, this beam lines up with an overhead beam in the cell so the trolley can be moved into the cell and out again by control from the crane cage. An electrical interlock prevents the trolley from being moved unless these beams are exactly in line, thereby insuring safe operation.

The crane equipped with a hoist drum, and long rope life is assured by using preformed rope, which resists fatigue induced by bending action of the rope around the drum and the fall block sheaves.

The power generated during testing is pumped back into the public utility power system supplying the plant, and this power is credited to the plant.

Develops Paint that Covers with One Coat

A new paint product, called Valdura Singlekote, that primes, seals and finishes interior surfaces in one application is announced by American-Marietta Co., 43 East Ohio street, Chicago. Formulated for maintenance painting of industrial, institutional and commercial properties, it combines the hiding power and economy of water-type paints with washability, durability and performance of oil-type coatings.

The paint may be applied to surfaces previously coated with calcimine or casein paints, providing the old covering is bonded. While it easily covers dirt, it is not recommended for use on oily or greasy surfaces. High hiding power permits coverage of dark surfaces with a single coat, and the product is self-leveling. It sets within two hours, dries within 12 hours and provides a dead-flat finish when viewed at a 90-degree angle.

Determining Tapping Temperatures by the SPOON TEST

Training open-hearth crews to judge temperature of steel by observing characteristics of sample is facilitated by moving picture camera. Numerous replicas of samples spooned through the wicket are compared on screen, thus saving considerable time

By A. G. AREND

Open-hearth helpers learn to judge tapping temperatures after lengthy practical experience

TRAINING OPERATIVES in the making of steel was to some extent retarded in earlier years because various practical features were understood to require so much experience that the immediate employment of fresh attendants could not be considered. That this need not necessarily be so has been fully demonstrated by the rapid methods applied in American training centers, where the total time necessary is reduced to its absolute minimum. This has, not unnaturally, raised some speculation by older steelmelters, with such references as "canned" methods from the U.S.A., etc., but under the present circumstances, it might be desirable to have a large surplus of freshly trained furnace attendants available, on the shortest possible notice. It is generally accepted that although the book-learning obtained from a study of numerous furnace log-books, showing charges, and periods occupied, etc., may acquaint one with the chief items, the matter of actual tapping heats could not be learned with precision except by lengthy practical experience.

Although the rod test and pyrometric control are still used, the spoon test is regarded as being the most reliable means of taking temperature measurements. It is this fact that has opened the field for the movie camera to be applied with suitably filtered light, under the most desirable conditions, since all the variations possible can be revealed in the most concentrated manner. Instead of the student being given instances of the spoon being withdrawn with its sample from the hearth, many hundreds of replicas can be projected on to a screen for comparison.

The time-saving is enormous, since should any doubts exist, these can be dispelled by making reference at any time to different parts of the movie film. This is because the correct and inaccurate application of the spoon test are both supplied under all conditions. The following is a short detail.

By having the temperature above that required for tapping at any time during the process, the metal may be gassy, tend to produce cracked ingots, and when actually tapped too hot, impair the inner surfaces of the mold and scour the ladle bricks, while if held above its tapping temperature, it would damage the furnace, and waste time. When tapped too cold, steel tends to splash, since on coming in contact with made-up metal round the pot bottom it is sprayed to the walls, and skulls form in the ladle, from which latter, the ladle bricks may be eventually torn out of place.

Use of a faulty spoon has not infrequently been responsible for furnaces having been kept waiting to tap unnecessarily long, and for this reason it has sometimes been suggested that standard makes of spoons should be utilized.

In some instances, instead of a definite thickness being adhered to, the bottom and sides differ in this respect, while the actual lips may be of almost pointed formation, which puts an added strain on the method of testing.

The movie film can reveal the correct position to take when making a comparison of the color of the bath, *i.e.*, away from the flame, by making use of the obstruction offered by the lower edge of the door. The blue glasses used to reduce the light cannot be expected to give an absolutely true rendering to the film as they do to the eye, but other associated points are revealed with great precision. These relate to practical wrinkles such as holding the spoon in the gas for a few minutes to warm up, filling, and pouring out the slag. This is shown repeated several times until a maximum thickness of slag coating has covered the spoon, and which may require a different number of immersions, before the actual sample is removed.

This repetition is necessary, and

From the *British Steelmaker*, February, 1942.

THE ELECTRIC CONTROLLER & MFG. CO.
E&M
CLEVELAND, OHIO

CRANE-BRIDGE CONTROL with

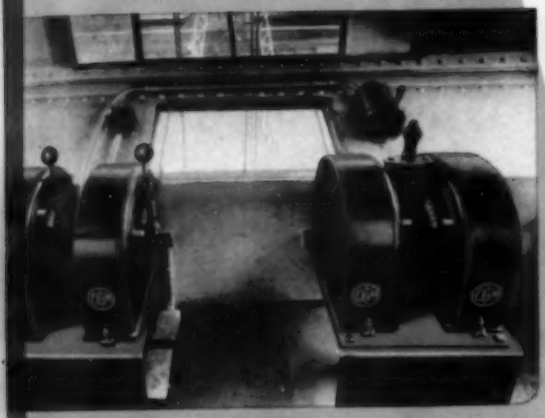
CONTROL—only a fractional part of the entire bridge cost, yet a vital factor in determining the efficiency of the bridge.

Gives you HIGH SPEED, LOW-COST PRODUCTION

Today speed with faster operation is extremely important. Equipment is called upon to handle greater and greater production.

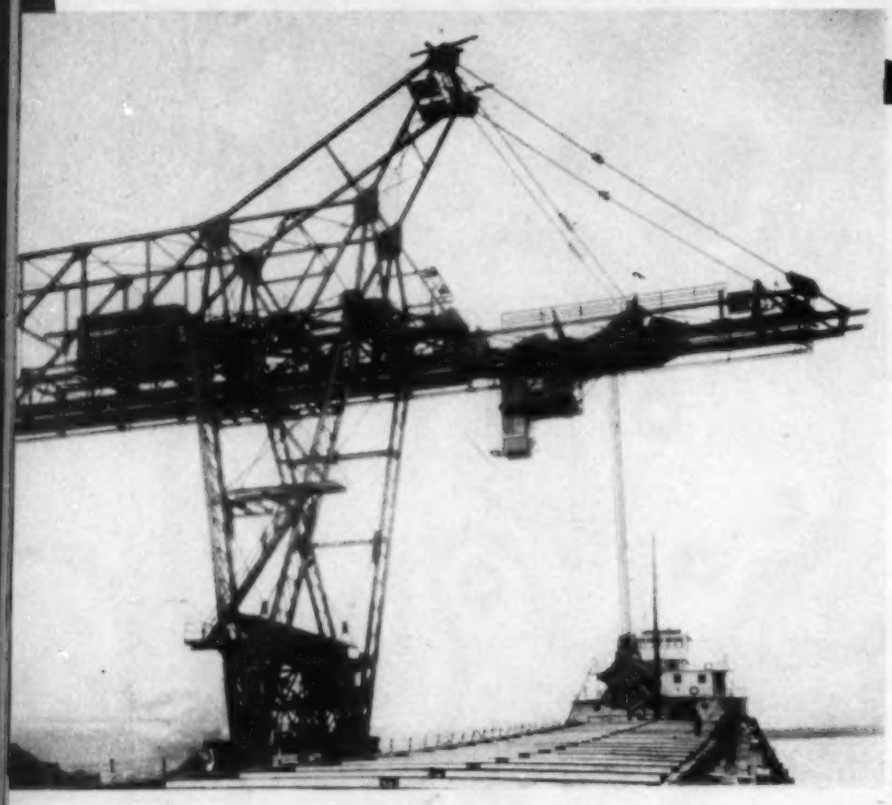
Control is the vital part of every bridge. It means quick spotting of the bucket over hopper. It determines the number of trips per hour. It insures safe stopping at the right spot without overtravel.

EC&M gives you these features, plus many others.



ve: The operator's cab showing Type
Master Switches. Hoist master on the
t. Bridge-propelling and Trolley mas-
on the left.

EC&M Control HAS MANY ADVANTAGES

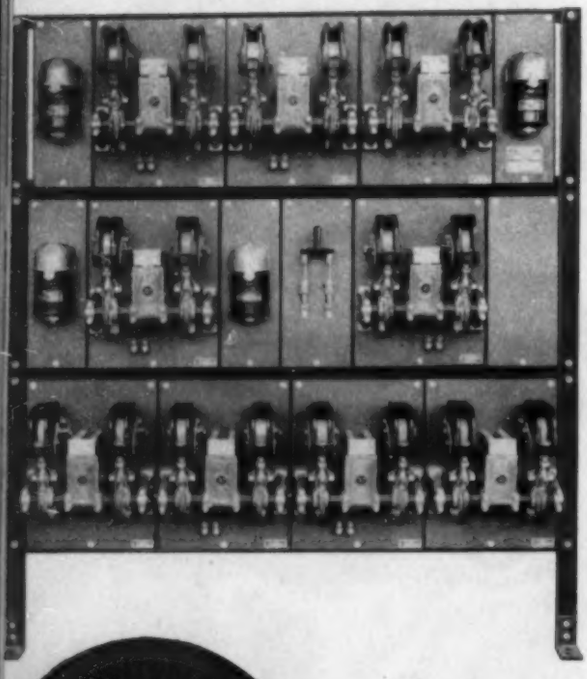


More HOISTS *per* HOUR *and Less Power Consumption with the* EC&M *Wright Circuit Hoist Controller*

The EC&M Wright Circuit Bucket-hoist Controller gives increased speeds with light loads—permits lowering an empty bucket about as fast as a loaded one.

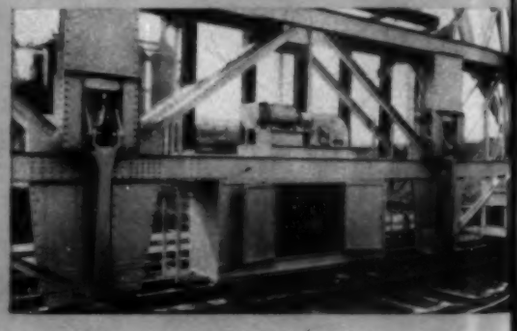
It saves on power, too. Only full load current is taken from the line on first point lowering. This means less heating on the motor—less current for commutator and contactors to handle.

Other outstanding features of the patented Wright Circuit are: Instantaneous brake release, simplified circuit giving simple, clean-cut controller, 100% safe operation and many other important advantages for increased safety and faster operation.



Propelling Controller Interlocked with Rail Clamps

EC&M's Unit-panel construction permits building the control to suit the headroom in the mounting space available. Controllers for propelling motion on this bridge are 2 decks high to permit convenient mounting in pier-leg as shown at the right.



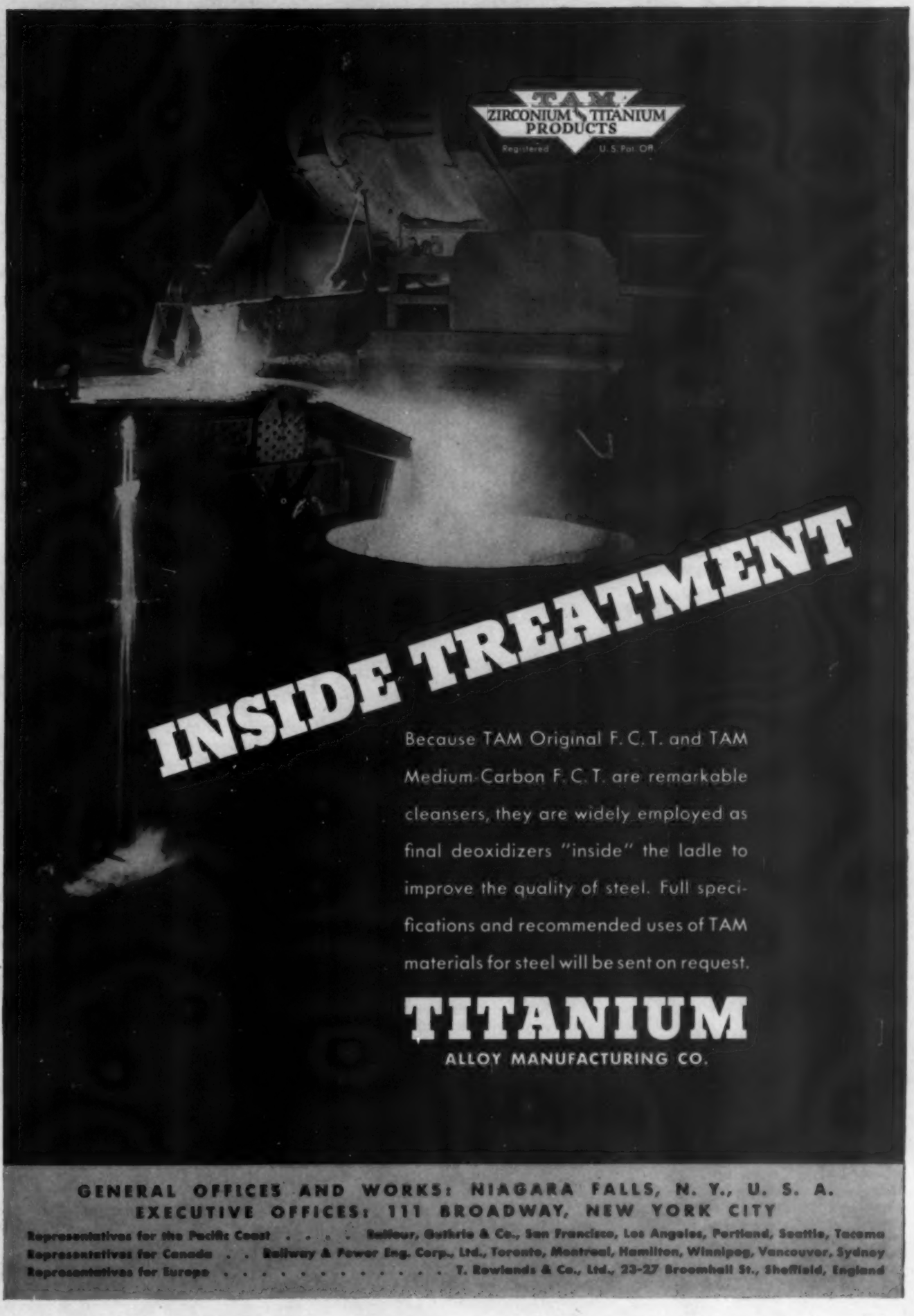
EC&M *Trolley Controllers Respond Quickly to Master Switch Movements*

★ The operator of a bridge with EC&M Control has many factors within his command which increase bridge efficiency. For example, the trolley controller with EC&M LINE-ARC Contactors and Time-Current Acceleration responds almost instantly to Master Switch movements. This means he can take the swing out of the bucket and spot it quickly over hopper, boat-hold, etc., to reduce the time between trips. There is no other control like EC&M LINE-ARC Contactor, Time-Current Control in this respect. Specify EC&M Crane-Bridge Control.

THE ELECTRIC CONTROLLER & MFG. CO.

2698 E. 79TH STREET — CLEVELAND, OHIO

Specify EC&M Crane-Bridge Control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INSIDE TREATMENT
Because TAM Original F. C. T. and TAM Medium-Carbon F. C. T. are remarkable cleansers, they are widely employed as final deoxidizers "inside" the ladle to improve the quality of steel. Full specifications and recommended uses of TAM materials for steel will be sent on request.
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Representatives for Europe . . . . . T. Rowlands & Co., Ltd., 23-27 Broomhall St., Sheffield, England

its extent depends upon not only the thermal capacity of the spoon, and conductivity of the slag, but also upon the consistency of the latter in respect to its temperature and chemical composition. Should the thermal capacity of the spoon be insufficient to allow the desired slag coating to be obtained, *i.e.*, by using a too light or too thin spoon, the latter heats up too rapidly, thus preventing the slag from reaching that required thickness. Extreme cases are shown by the movie film where the whole of the sample cannot be poured from a thin spoon, because heat has been removed from the latter so quickly.

Spoon sample of basic open-hearth steel being poured into test mold

As regards the different slag layers, chilling proceeds successively more slowly with each withdrawal of the sample, since the abstracted heat has to pass through the slag layer before it reaches the metal of the spoon. Ultimately, a compensating or balancing influence is secured immediately before taking the sample. At this point, the slag on the spoon has reached a thickness wherein the rate of conductivity of heat through it to the latter is such that the heat transferred from the slag surface is not sufficient to remove the superheat of that neighboring slag. In this way, no further solidification can be caused, and it cannot build up, since both liquid slag within the spoon, and that on outer surfaces, is nearly at same temperature.

It should be made clear that too thick a spoon is, however, unwieldly to handle and exerts no appreciable difference on the chilling of the slag. Light, or thin spoons, on the other hand, become heated too rapidly by the first slag coating, and as there is little to prevent the temperature increasing appreciably, they become covered with an insufficient coating. A skulled spoon results because of the chilling of the steel, since during pouring, the former is still rapidly absorbing heat. A uniform thickness should be provided for all parts of the spoon, without making it too heavy, and yet ensuring that the slag covering is the maximum obtainable. The ease with which the adapted movie camera can first take these "shots," and then have them projected on a screen in full detail, will be appreciated, as different designs of spoons of correct and incorrect dimensions are purposely used to reveal the test in all detail.

Practical Information Obtained

The best temperature at which the steel should be tapped is dependent upon the period expected to lapse between opening the taphole and commencing the teeming operation, the quality of steel, the size and temperature of the ladle and number of stoppers used, the quantity of ladle additions, and whether the molds to be cast are to be top or bottom poured. Higher carbon heats, with fewer ladle additions, hot ladles with more stoppers, and few top poured ingots can be successfully dealt with at less heat.

Greater temperature is required to ensure the fluidity for lower carbon heats, for a larger number of bottom poured molds, using larger and comparatively colder molds, and particularly where more time has to elapse in transporting from furnace to mold. Two definite features are displayed by the spoon test, namely, that where the steel leaves some scum around the edges, and does not pour from it cleanly, tapping cannot be proceeded with, whereas boiling steel in the spoon, although appearing to teem clear from the ladle, may give a poor product. This appearance of boiling may be due to the metal being hot, oxidized, or under a thin slag. In respect of the display of a projected film, the color, despite much research work being involved, is not trustworthy. What is shown with precision is whether or not the metal completely leaves the spoon, how rapidly the surface oxidizes over, whether it boils, and whether it leaves the spoon with difficulty, or appears to be thoroughly fluid.

Behavior Exposed Easily

A feature of the study is the ease with which the behavior of oxide flakes can be displayed, *i.e.*, using the normal or ultra-rapid camera. This shows if the oxide flakes rapidly appear or disappear over the various parts of the exposed surface, and whether they tend to combine to large patches. Equally clearly displayed is the general character and behavior of the meniscus. This may be, as one writer puts it, like that of mercury showing high surface tension when the metal is clean, or like that of water in glass where the surface tension appears to drop during pouring, whereby the meniscus tends to turn up.

Surface tension is evident from the meniscus of the metal, and the last drop to leave the spoon possesses a spherical shape, while only small oxide flakes are acquired. By suitable magnification on projection, these features are revealed in a detail which brooks no denial, and the student can ascertain all points in the minimum of time. As regards oxide flakes, as a rule, with a high-carbon content these are smaller, and form later on teeming, *i.e.*, at a specific temperature. In displaying different examples, care is taken to project on the screen how the spoon appears with successive increments of heat.

Thus the first set of samples simply show metal skulls forming, followed by the metal just managing to drag its way out, but yet leaving a slight skull, after which scales appear which grow larger, and finally, the clear bright surface is obtained with small scales. In noting the rate of oxidation, this is best displayed by using the same carbon content, since then the more rapidly this occurs the more cold is the steel.

Different anomalies which also can appear in practice, such as vari-

(*Please turn to Page* 125)

For Speeding Plant Conversion—
MOTCH & MERRYWEATHER COLD SAWING MACHINES

First, the change-over to war production. Then, a mounting determination to turn out more and *more* and *still more* materiel. In these procedures the cold sawing of metal holds an increasingly important place. Motch & Merryweather Cold Sawing Machines can greatly simplify your plant conversion and then lift your production rate because of five proven qualities:

Accuracy. The M & M Cold Saw delivers consistently square sections without chatter or burr, without variation, and without scrap.

Speed. You get steady cutting speeds up to 1-1/2 times the highest rate ever attained before. "Amazing!" technicians declare.

Flexibility. Available is a range of attachments for the single or multiple cutting of practically any metal, ferrous or non-ferrous.

Capacity. Two sizes, the No. 3 and No. 4, handle round stock up to 16" and squares up to 14-1/2".

Stamina. You can run the M & M Cold Sawing Machine to capacity 168 hours a week and keep it up indefinitely. Ask for our bulletin.

Motch & Merryweather Cold Sawing Machines have speeded the cutting of billets for gun barrels, of shell slugs and other items of war production.

Motch & Merryweather Saw Blades fit any standard machine. They excel in design, fit, workmanship, cutting speed and endurance. Sizes, 26", 28", 30", 38", 42", 44".

THE MOTCH & MERRYWEATHER MACHINERY COMPANY
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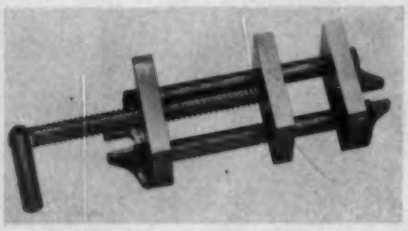
MOTCH AND MERRYWEATHER THE MACHINERY CO
CLEVELAND CINCINNATI DETROIT PITTSBURGH

INDUSTRIAL EQUIPMENT

Drill-Press Vise

Patterson-Ballagh Corp., 1900 East Sixty-fifth street, Los Angeles, announces a simple practical all steel drill-press vise to meet various shop conditions. Incorporation of two guide bars permits the operator



to drill completely through the work without damaging the vise. The unit is said to be adapted to small assembly work and to hold small pieces for machining, filing, etc., during bench operations. It is offered in two sizes with 3 and 5¼-inch openings.

Air-Tool Filter

Filters Inc., Glendale, Calif., announces CCA 2 and 3-outlet filter for serving two or three air tool operations at one point. It prevents harmful dust, rust scale, oil and water from going into air tools. Its most valuable use is in cutting down the number of rejects on precision-machined parts, which can be damaged by the sandblasting-effect

of dust and moisture in the air jets used to clean them.

Centrifugal action of air within the filter removes 90 per cent of the dirt and moisture and the balance is filtered out by a special wool-felt glove. For cleaning, water and dirt are blown out of the drain valve at the bottom of the bowl and filter may be completely dismantled without disconnecting from the line. The 3-way air filter illustrated was developed in collaboration with Burklyn Corp., and provides a handy plug-in of air tools—as simple as plugging an electric cord into the wall.

Balancing Machine

Gisholt Machine Co., 1217 East Washington avenue, Madison, Wis., is offering a portable balancing unit used to detect unbalance in large rotating parts of special design without disassembling the whole machine. Such special machine parts, in small quantities, with rotating speeds from 100 to 10,000 revolutions per minute can be checked for unbalance by means of this Westinghouse designed unit. It in-

dicates both phase angle and amplitude of vibration. From these readings, locations where corrective weights are needed may be readily determined. The instrument is not a substitute for but rather an augmentation of the company's line of "production" balancing equipment.

Cowl Fastener

Aviation Division, Shakeproof Inc., 2501 North Keeler avenue, Chicago, has introduced a cowl fastener of simplified design reported to speed up assembly. It consists of three parts—main spring, stud and cross pin. Only two special tools, according to the company, are required for application.

To install the fastener, the main spring is riveted in place over a drilled or punched clearance hole in the inner surface sheet. The stud member is inserted in a matching clearance hole in the outer sheet and the cross pin is then press-fitted in the stud with special pliers. Upon closure of the cowling or removable part the stud member and main spring quickly come into alignment position. A clockwise quarter turn locks the stud and pulls the parts together with a powerful dual spring tension. The stud is automatically stopped in position by detents in the cams of the main spring.

The fasteners are made in two

sizes to conform to AN strength classifications 5 and 7 (up to 500 and 700 pounds tension respectively), and with flush, oval and wing head studs. Standard units are offered to accommodate total material thicknesses ranging from 0.035 to 0.254-inch.

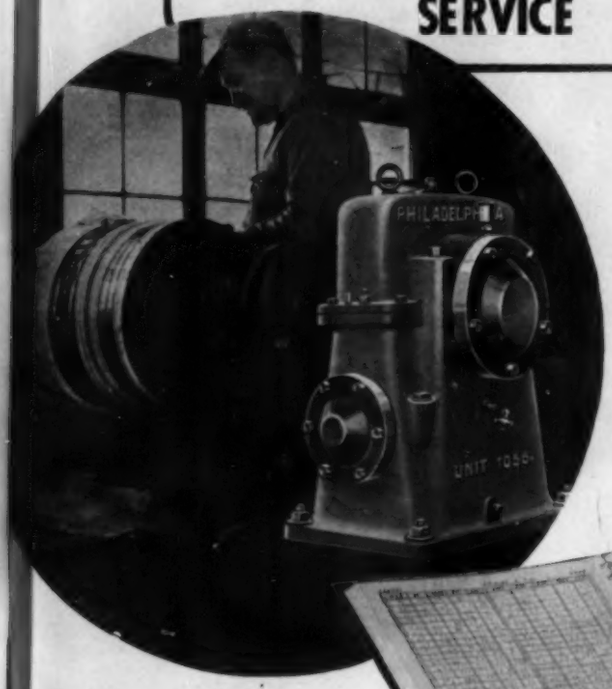
Seam Welders

Progressive Welder Co., 3050 East Outer drive, Detroit, is now offering a complete line of seam welders, in three capacity ranges and 126 models. In each of the light, medium and heavy-duty series, several standard throat depths are avail-

able, while each type is available in six different standard drives, three for circular and three for straight seam welding.

The universal model which may be used for both straight and cir-

YOU CAN SEE BY THE RECORDS PHILADELPHIA SPEED REDUCERS ARE PHYSICALLY FIT FOR WARTIME SERVICE



Philadelphia Worm Gear Reducer installed in the Electrical Maintenance Department of Eastern Transportation Company.

Yes, Philadelphia Speed Reducers of all types, when properly selected for the intended service will solve your problem of transmitting power with a high degree of efficiency to the machines running long, steady hours, turning out the weapons of war.

Philadelphia Units are ruggedly constructed and amply housed with sufficient area for heat dispersion. Each one embodies certain custom built qualities and individual service characteristics that assure its performing efficiently and with little attention.

With a complete line to choose from we can recommend the right unit for your next drive problem.

PHILADELPHIA GEAR WORKS

INDUSTRIAL GEARS
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LIMITORQUE VALVE CONTROLS

ERIE AVENUE & G STREET
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Philadelphia
LIMITORQUE CONTROL
operates all types of valves, etc., safely, economically, from convenient stations.

Philadelphia
GEARS
All types and sizes of industrial gears. Can be supplied in all materials.

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WORM GEAR SPEED REDUCER
right angle drives — vertical or horizontal. Wide range of ratios and horsepowers.

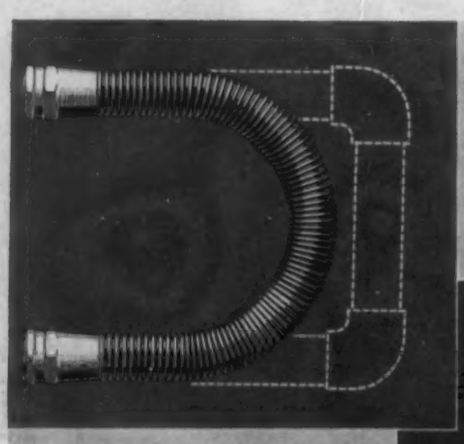
Philadelphia
MOTOREDUCER
The economical self-contained drive, Horizontal or Vertical types — various ratios and horsepowers.

Philadelphia
HERRINGBONE SPEED REDUCER
for heavy loads at high speed. Single, Double, Triple Reductions, various ratios and horsepowers.

add speed

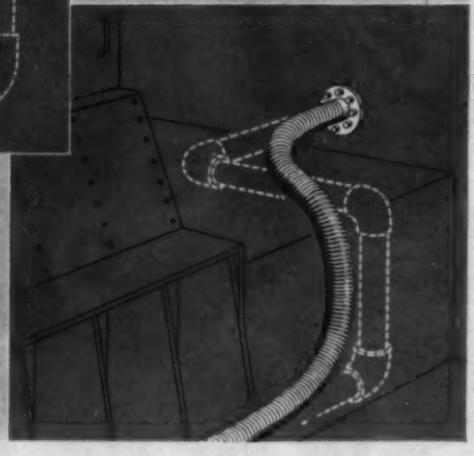
to assembly, maintenance, repair and temporary hook-ups

Use flexible metal hose . . . for pipe connections where speed of installation is paramount



Rex Flexible Metal Hose can be bent to position by hand and coupled, in a fraction of the time required to fit a pipe connection. ←

Rex Flexible Metal Hose can be "snaked" quickly into place in installations requiring turns, eliminating all intermediate connections. →



Rex Flexible Metal Hose speeds up production, facilitates assembly, reduces down-time. Ask for recommendations on the type of metal hose best suited to your needs from the wide and diverse Chicago Metal Hose production types available.

Use our production capacity to increase your production

Rex-Weld Corrugated Flexible Metal Hose • Rex-Tube Interlocked Flexible Metal Hose • Rex-Flex Stainless Steel Flexible Tubing Avioflex Oil Line Hose • Cellu-lined Hydraulic Hose

CHICAGO METAL HOSE CORPORATION

MAYWOOD, ILLINOIS

Factories: Maywood and Elgin, Illinois

cular welding also is offered in three drive types and in each capacity range. These new welders are for either interrupted or continuous seam-welding and incorporate all latest developments. They obtain operating pressure through a double-acting adjustable-stroke air cylinder mounted directly on head support of each machine. A double-action solenoid-operated valve is used to control air pressure on the pressure (top) side of the piston as well as for the introduction of air at line pressure on the lower side of the piston for rapid return of the head. A speed control valve is supplied in the air lines to both intake and exhaust sides of the cylinder to reduce shock.

The solenoid valve is operated through a 2-stage foot switch. The first stage brings the upper wheel down on the work, while the second starts the motor and sets welding wheels in motion simultaneously with closing of welding current circuit, the pressure switch being connected with the second stage of the foot switch. A special nonferrous alloy is used to line the cast bearing housing. The solid lower arms are designed to suit the individual job. These are externally water-cooled. Adjustment of stroke is provided by a hand-wheel controlling position of a dummy piston in the machine head, this adjustment also compensating for wheel wear, and eliminating necessity for vertical adjustment of piston rod or head support.

Airless Cleaner

American Foundry Equipment Co., 555 South Byrkit street, Mishawaka, Ind., announces a portable Wheelabrator for the blast room—an entirely new development for cleaning large and small miscellaneous products in a blast room, without using compressed air. Being airless, it

does not utilize such equipment as; air compressor motors, pressure tanks, mixing chambers, air receivers, piping, hose, valves and nozzles. The unit is especially suitable for cleaning small intricate, irregular shaped work such as handled in jobbing shops or where the daily production of various parts does not warrant the use of special equipment. The unit handles about 70 pounds of abrasive per minute at normal capacity and is driven by a 2-horsepower electric motor. The unit's housing measures 18 inches. Its motor housing is 12 inches.

Protective Metal Box For Fire Extinguishers

Erie Supply & Equipment Co., Sandusky, O., has placed on the market a Tamproof metal box for protecting fire extinguishers against possible sabotage or accidents. Glass windows are included in the unit to facilitate inspection. Feature of the box is a breaker arm which when pressed breaks the lock seal

springing the door open and revealing the extinguisher ready for use. This feature works even though the box is padlocked. If the seal is broken other than in an emergency, it means the extinguisher has been tampered with. As the box is dust tight, it keeps the extinguisher in good condition, free from grease, dirt and grime.

Crate Grab, Carrier

Cleveland Crane & Engineering Co., Wickliffe, O., has placed on the market a new motor-driven crate grab and carrier for handling crates and boxes in and out of storage, or from one elevation to another.

ROEBLING *Wires*

ROUND . . . FLAT . . . SHAPED

A FEW WIRES TYPICAL OF ROEBLING'S BROAD SPECIALTY PRODUCTION

FOR VICTORY ASSIGNMENTS WHERE WIRE MUST BE RIGHT!

SHAPED WIRES

FLAT WIRE TO SPECIFICATIONS

MUSIC WIRE FOR PARACHUTE PILOT-CHUTES

The springy frame for the small pilot-chute that pulls the Army parachute from the pack *must be right.* The Roebling wire used for this service meets exceptionally high standards for steel analysis, temper and fatigue resistance.

The speed and quality required by war production again prove the wisdom of turning to Roebling for special round, flat or shaped wires. If you have a tough job, avail yourself of Roebling's long experience in the production of high grade wire. Every day we're turning out wire to specifications demanding the finest craftsmanship and close adherence to physical and chemical requirements.

Special facilities to handle this type of work . . . Man-power to give it the close attention to details it requires . . . these are Roebling's contribution to your Victory program.

JAR ROEBLING

JOHN A. ROEBLING'S SONS COMPANY

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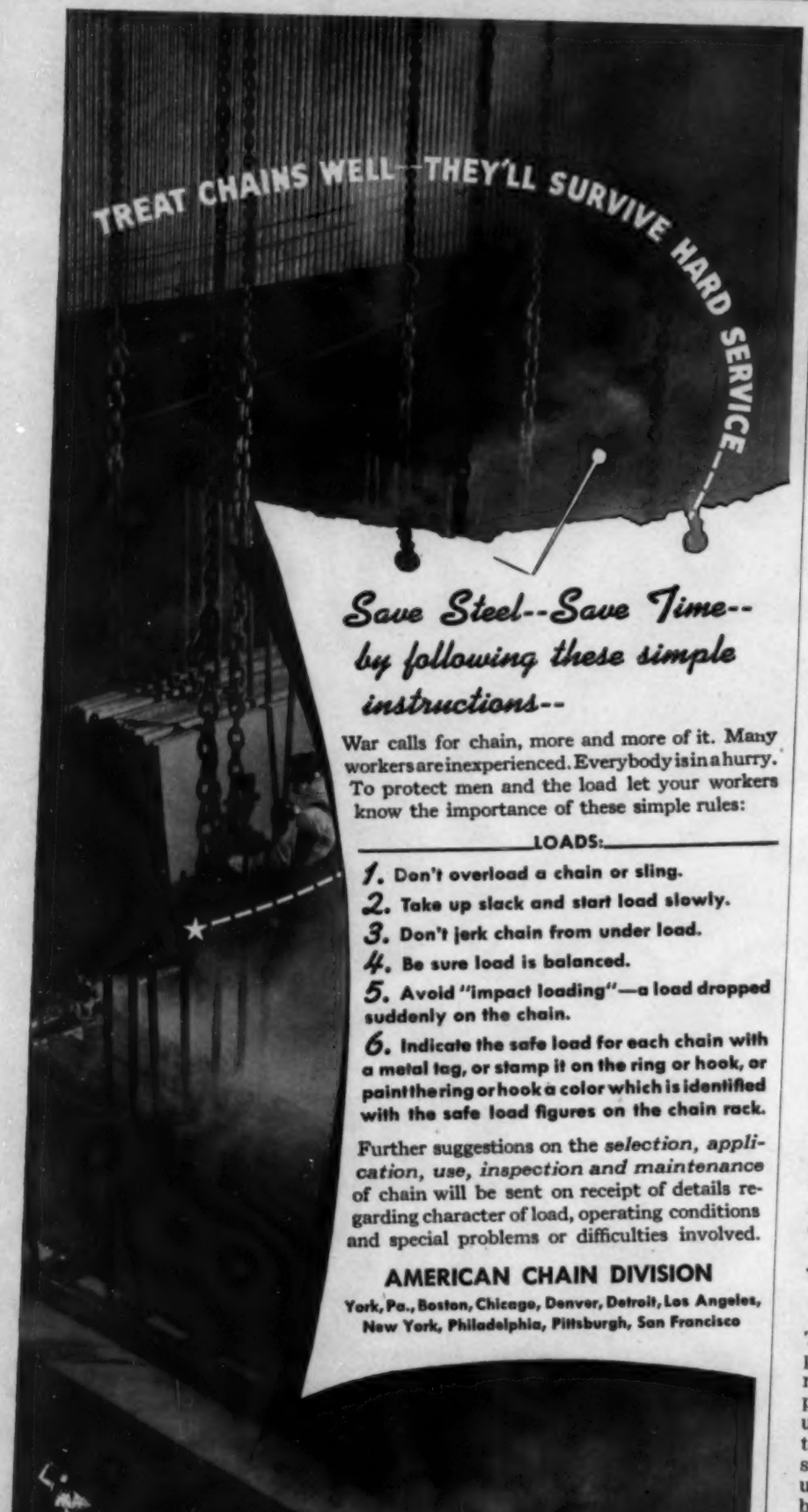

Save Steel--Save Time--
by following these simple instructions--

War calls for chain, more and more of it. Many workers are inexperienced. Everybody is in a hurry. To protect men and the load let your workers know the importance of these simple rules:

LOADS:

1. Don't overload a chain or sling.
2. Take up slack and start load slowly.
3. Don't jerk chain from under load.
4. Be sure load is balanced.
5. Avoid "impact loading"—a load dropped suddenly on the chain.
6. Indicate the safe load for each chain with a metal tag, or stamp it on the ring or hook, or paint the ring or hook a color which is identified with the safe load figures on the chain rack.

Further suggestions on the *selection, application, use, inspection and maintenance* of chain will be sent on receipt of details regarding character of load, operating conditions and special problems or difficulties involved.

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York, Pa., Boston, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco

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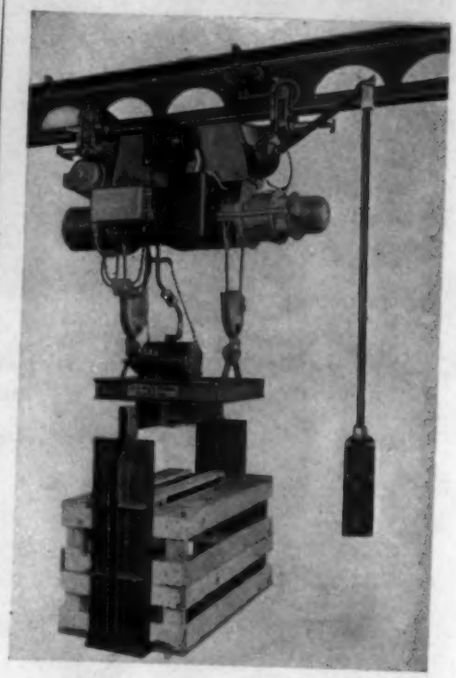
It enables the quick stacking or removal of crates at a great height with safety.

The grab and carrier operations are controlled by six buttons of the push-button station. It also can be provided with an operator's cab, if desired. Arms of the grab are



extended and retracted by means of geared slide bars that are driven by the motor mounted on top of the grab. Power is supplied to this motor through a flexible cable held taut by a spring-type retrieving reel. A double-hook cable electric hoist elevates and lowers the grab with little swing, making it easy to spot. A quick acting electric brake stops and holds the load wherever desired.

Unit illustrated will handle one or more boxes at one time. It will lift loads up to 1500 pounds a distance of 20 feet. The arms may be spread to a maximum of 36 inches and retracted to a minimum of 18 inches.

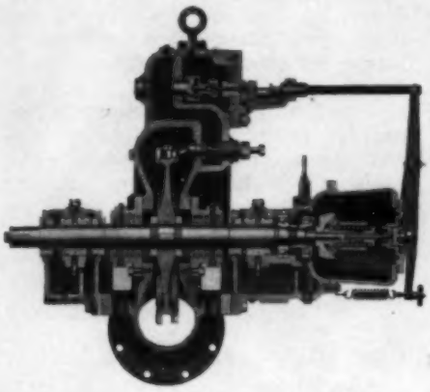
Velocity-Stage Turbine

De Laval Steam Turbine Co., Trenton, N. J., announces an improved velocity-stage turbine to meet modern conditions of steam pressure and temperature. In this unit, steam expands from the initial to the final pressure in a single set of nozzles. It then is directed upon a first row of stainless steel buckets, which are individually fastened to the wheel. From these buckets it enters between stationary stainless steel guide vanes integral with and supported by the nozzles, which redirect it upon a second row of moving buckets.

The casing cover of the turbine combines in one casting the steam

chest, speed-governer and emergency shut-off valve bodies. These and the nozzles are the only parts of the turbine coming into contact with steam at the initial pressure and temperature. The cover and attached parts are easily lifted to expose the wheel. Parts subject to the highest temperatures are remote from and above the shaft and bearings, resulting in lower temperatures of bearings and oil. For moderate temperatures the babbitt-lined bearings are lubricated by rings which carry oil up from reservoirs, but where temperature of the steam at inlet or at exhaust is excessive, water-cooling or forced-feed lubrication can be provided.

The wheel, machined from a steel forging, is held by key and lock



nut upon a shaft of liberal size. Steam or air leakage is prevented by packings on the shaft at each side of the casing. The turbine is equipped with a centrifugal speed governor and an indpeendent emergency tripping device consisting of an eccentrically loaded, pivoted ring which, at a predetermined speed, releases the independent emergency shut-off valve. The valve also can be tripped and reset by hand. The speed-regulating governor, consisting of fly-weights pivoted upon rockers, is either mounted on the turbine shaft or, depending upon operating conditions, on a vertical shaft driven through a worm and worm wheel. The governing action is transmitted to the regulating valve through a ball thrust bearing and a lever mounted on a needle bearing. The regulating valve is of the balanced, seating type and is actuated through a stainless steel stem packed with asbestos rings.

Aircraft Relay

Industrial Control Division, General Electric Co., Schenectady, N. Y., announces a new sensitive direct-current relay for aircraft service. Designated as CR2791-C100C, it is designed specially for use in vacuum tube output circuits where power available is so small it re-

"I Do This Every Year!" Accident-conscious men of industry look anxiously to the hot months — months when men sweat most — when ever-lurking Heat-Fag takes its heavy toll. It is a fact that as the heat curve goes up, so does the accident rate. For, workers who sweat lose body salt. Unless it is replaced — fatigue sets in. Vitality is sapped — men become inalert . . . and that's when accidents happen . . . and when man-hours are lost. For, Heat-Fag and accidents ride together!

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QUICK DISSOLVING
(less than 30 seconds)
This is how a Morton Salt Tablet looks when magnified. Examine one—see how soft and porous it is inside. When swallowed whole — with a drink of water, they dissolve in less than 30 seconds.

Wherever workers sweat, Salt Tablets are needed, for they represent the simple, easy way to replace salt that's lost through sweating and hot work.

Case of 9000 10-grain salt tablets, ... $2.60

Salt-Dextrose Tablets, case of 9000 . . . . . $3.15

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MORTON SALT CO., Chicago, Ill.

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Write—on your firm letterhead — for a pocket size sample tube of Morton's Salt Tablets and for the new folder — "Heat-Fag and Accidents Ride Together."

EVERYONE WHO SWEATS NEEDS SALT

quires operation in extremely low currents.

A sealed aluminum cover protects the relay from dust and against damage from rough handling. It is small, weighing 3¼ ounces, and meets all Air Force requirements.

It has a maximum continuous current rating of 2 amperes at 32 volts, and a maximum make or break rating of 10 amperes. Coil is rated at 32 milliwatts minimum.

Flame Cutting Tips

Air Reduction, 60 East Forty-second street, New York, announces two additions to its line of oxyacetylene flame cutting tips. The first, known as style 108, is ideal for working in close quarters. It is bent in an offset shape, to permit cutting along a line 21/32-inch from the vertical centerline of the torch head or barrel.

This design meets the problem of cutting close to bulkheads, flanges or shoulders where the torch head radius would prevent alignment of the cutting orifice vertically over the desired line or cut. The tip has milled flat sides, with two preheat flames, and is suitable for either machine cutting or hand cutting operations. It is available at present in sizes Nos. 1 to 3, for cutting steel up to 1⅛ inches thick.

The other addition is the style

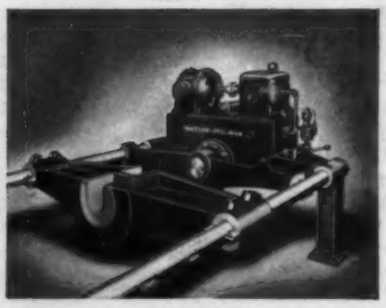
139 straight tip with one preheat orifice, for certain machine or hand cutting operations. Made in sizes Nos. 0 to 3, it is particularly adapted to splitting angle iron, straight-line cutting using a straight edge as a guide, or sheet metal cutting operations, in which light preheat is desired.

Inspection Gage

Federal Products Corp., Providence, R. I., announces a model 294 P-26 gage for inspecting the distance between faces of crankshaft bearings. Its master check is located at the left of gage. The sensitive contact point at the right of the base is mounted on a triangular piece which is supported on flat springs, allowing it to transfer the motion to the indicator without friction or lost motion. The latter can be controlled by the screw and check nut below the indicator point.

Forcing Press

Watson-Stillman Co., Roselle, N. J., announces a new 100-ton forcing press motions of which are controlled by a single hand lever. The unit is entirely self-contained, including the 10-horsepower motor and variable delivery radial piston pump. The press is of horizontal,



2-bar type. It is used for forcing shafts into rotors but also is suitable for any other forcing operation. Distance between its bars is 72 inches. Opening is adjustable from 24 to 120 inches. Ram stroke of the press is 18 inches. Its advance speed is 200 inches per minute, pressing speed being variable from 0 to 25 inches per minute. Return speed of the press is 140 inches per minute.

Tool Stand

Radiant Mfg. Corp., 1140 West Superior street, Chicago, has placed on the market a Quick-Set stand

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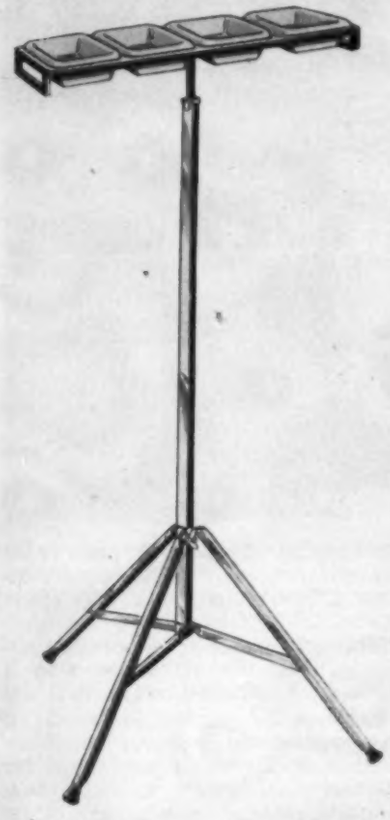
which makes it possible to have tools and materials in just the right spot for the workman's use. It can be erected in a matter of seconds and taken down as quickly.

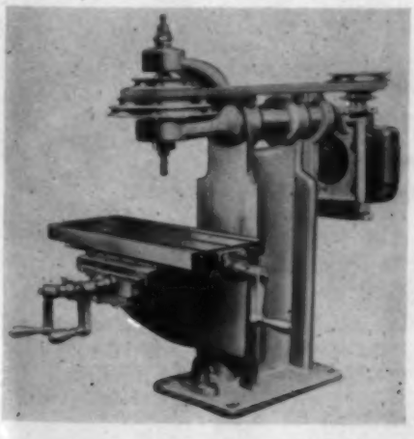
A portable unit, it comes in two



sizes—the senior model which extends from 65 to 108 inches, and the junior with an extension of 34 to 55 inches. Leg spread of the senior is 34 inches—of the junior 26 inches. Both models feature an Auto-Lock and automatic tripod catch. Eight standard accessories are offered with the unit. These include both trays and brackets.

Vertical Bench Miller

Duro Mfg. Co., 800 East Sixty-first street, Los Angeles, has introduced a new precision vertical bench milling machine equally adaptable to tool room and high-speed production lines. It incorporates precision



taper roller bearings in the spindle and is guaranteed to have a run out of 0.0003.

Splined disengageable handles operate the micrometer adjustments for each direction of the table movement, of which the vertical travel is 7 inches, longitudinal travel 8 inches and transverse travel 5 inches. The one-piece spindle support arm of the machine is equipped with an adjustable graduated dial and index pin. Adjustments can be made to 60 degrees each side of center. A "floating" motor mount maintains proper tension of the V-belt at all times and permits instant manual change through the four spindle speeds of 450, 850, 1400 and 2100 revolutions per minute.

Searchlight

Westinghouse Lighting Division, Cleveland, announces a new 18-inch incandescent searchlight with pilot house control or flat base. It provides intense beam concentration by means of a primary precision-ground and polished silvered-glass reflector and a metal secondary reflector to permit continuous operation with lamps up to and including 1500 watts. A tandem reflector shield,

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Oil gets on armatures, causing short-circuits, because it always drips or is thrown from bearings. Oil-soaked windings are shorted and burnt out, causing expensive delays that hold back production.

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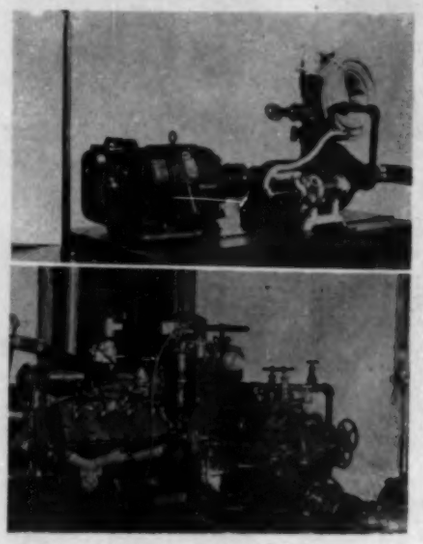
mounted in the center of the primary reflector eliminates all secondary heat concentration on the lamp bulb. Heat dissipation is by radiation, permitting a dust-tight enclosure. Body and back sections of the searchlight housing are of sheet steel. Door and door frame are of cast iron with integrally cast hinge and lathe lugs. The door is clamped in position against a weather-tight heat-resisting gasket. The lens is of heat and impact resisting polished glass mounted against a weather-tight gasket and held in position by steel spring clips. Primary reflector is a 19-inch parabolic commercial-precision mirror coated with silver and sealed by an electrolytic coating of copper and synthetic material. Secondary reflector is of polished metal too and provides high reflectivity.

Fire Pumps

Fairbanks, Morse & Co., 600 South Michigan avenue, Chicago, has introduced two new special-duty pump units suitable for small plants and towns to serve as standby units in case of bomb raids or fires from other sources. One of these fire pumping units is composed of a 4-inch Figure 5813 F-M fire pump driven by a Ford-Mercury engine. The engine drive, turning at 2500 revolutions per minute, is of sufficient speed to be direct connected,



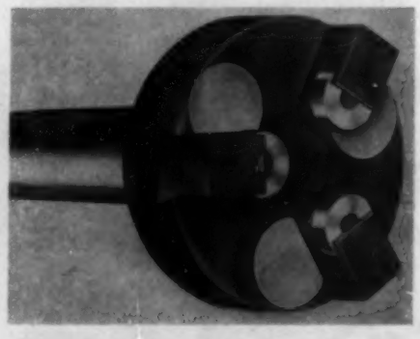
eliminating expense of gear drive necessitated when a slow-speed engine is connected to a high-speed pump.

The other unit is a portable affair which may be adapted to a variety of services, municipal and otherwise. A typical example of this type unit, shown in upper illustration, was recently assembled for Waverly, O. Here a 2-inch nonclogging sludge pump was direct connected to a 3-horsepower splash-proof motor and mounted on a standard warehouse truck with 8-inch rubber-tired wheels.

The pump is primed by a hand-operated bracket-type pump mounted on the truck platform with its suction connected to the top of the volute through a ¾-inch pipe line.

Burnish Tool

Boyar-Schultz Corp., 2110 Walnut street, Chicago, has placed on the market a new model C burnish tool for automatic screw machines. It is said to be easily and quickly adjusted for efficient work where



a smoother surface is necessary than that produced by the usual machining operation. The tool is being offered in three sizes—00, 0 and 2.

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Uses for Cobalt

(*Continued from Page* 81)

so, the cobalt requirement for this use alone may exceed 150,000 pounds annually.

High-Performance Magnetic Alloys: Permanent magnets are employed in electric meters, relays, regulating devices, fractional horsepower motors and generators, switching appliances, and a variety of other uses too numerous to list. It is common knowledge that most high-performance permanent magnets contain cobalt.

The ordinary noncobalt permanent magnets of commerce are made from low-alloy chromium or tungsten steels. The largest tonnage of permanent magnet steels probably goes into the manufacture of watt-hour meters. The magnets for these meters are generally chromium steels containing 0.9 to 6 per cent chromium and 0.6 to 1.0 per cent carbon. Coercive-force values range from 50 to 70 oersteds and remanence values from 9000 to 11,000 gausses and give rise to (BrHc) values of 0.5×10^6 to 0.68×10^6 gauss-oersteds. Magnets of this type are also used for cheap toys. Plain chromium magnets cannot be expected to replace cobalt magnets.

Low-tungsten steels have about the same magnetic characteristics as the chromium steels mentioned above and cannot be regarded as being able to help the cobalt situation.

Simple molybdenum steels containing 0.8 to 1 per cent carbon and 2 to 4 per cent molybdenum produce permanent magnet materials with about the same performance as simple chromium and tungsten steels.

Other elements, such as titanium, vanadium, beryllium and tantalum have not been found to produce any marked increases in coercive force or performance when alloyed with plain carbon steels.

A number of chromium-tungsten-cobalt steels containing little cobalt have been developed. Studies show the relationship between the cobalt content and the coercive force to be linear.

Therefore the coercive force can be expressed as a function of the cobalt content. The significance of such studies from the standpoint of cobalt conservation and substitution in permanent magnets is that *it is almost impossible to find a substitute for cobalt in magnet steels.* Some conservation can be effected by utilizing various complex steels having less cobalt. One such is 15 per cent cobalt, 10 chromium, 0.9 carbon. This steel shows a (BrHc) value approximately equivalent to that of a 30 per cent plain cobalt steel; 10 per cent chromium has replaced 15 per cent cobalt. It is true that chromium is also one of the strategic metals at present, but the drain on chromium supplies to make 10 per cent chromium magnets would be relatively small.

Precipitation-Hardening Magnet Alloys: This class of magnetic materials differs from the magnet steels in that the metals contain little or no carbon, are not magnetic as cast, and are given the desired properties by precipitation of one or more of the alloying constituents from a solid solution under controlled conditions. Precipitation-hardened magnet alloys represent the highest-performance magnetic alloys known. Their mechanical properties are, in many instances, detrimental for certain applications because some of the alloys are brittle and cannot be forged or machined. These brittle alloys are used where magnet designs permit casting of the final magnet shapes.

These magnet materials can be prepared by use of power metallurgy. Small pieces and those of intricate shape can be fabricated satisfactorily in this way.

Tabe III gives the commercial 8.5 per cent cobalt steel with possible substitutes for it. It reveals that insofar as magnetic properties are concerned, the molybdenum alloy No. 2, the tungsten-chromium-mo-

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An exceptional instance, of course, but indicative of Ampco Metal's ability to give long life and excellent service in out-of-the-ordinary applications.

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lybdenum alloy No. 4, and the nickel-aluminum alloy No. 7 can be substituted, after proper heat treatment, directly for the commercial 8.5 per cent cobalt steel No. 1. The remanence and coercive force values are identical. Alloy No. 2, containing 23.4 per cent moybdenum, can be forged satisfactorily at 1100 degrees Cent. The working must be done before hardening. It is highly probable that all the alloys in Tabe III, with the exception of the nickel-aluminum metal, No. 7, can be mechanically worked before hardening.

Alloy No. 7 is brittle and must be cast into shape. The tungsten-chromium alloys (Nos. 5 and 6) approach the properties of the 8.5 per cent cobalt steel closely enough to be considered possible substitutes for the latter. Variations in the coercive force to remanence ratio for the tungsten-chromium alloys probably would necessitate slight changes in magnet designs if these alloys were substituted for the 8.5 per cent cobalt steel.

It is seen that acceptable substitutes containing no cobalt can be had for the low-cobalt magnet steels.

A study of data that compares some possible substitutes for cobalt-chromium magnet steel reveals that after proper heat treatment the 23.4 per cent molybdenum and the 26 - 7 - 9 tungsten - chromium - molybdenum alloys can replace the 16 per cent cobalt steel. One alloy contains 5 per cent cobalt, but it might replace the 16 per cent cobalt steel in some applications and permit some conservation of cobalt.

Oxide Magnets: Permanent magnets may be made by pressing metal-oxide powders and subjecting them to heat. They must be magnetized while hot to give the most desirable magnetic properties. The remanence values are generally low, but coercive forces up to 750 oersteds may be obtained. Small amounts of oxide magnets are in use, but they do not, at present, involve large quantities of cobalt.

Conclusions that can be drawn with regard to substitutes for and conservation of cobalt in permanent magnet materials are:

—Molybdenum dispersion - hardened and tungsten-chromium-molybdenum dispersion-hardened alloys, containing no cobalt, can be substituted with little or no change in magnet design for the ordinary commercial low-cobalt magnet steel.

—Nickel-aluminum alloys with no cobalt can also replace commercial low-cobalt steels where the magnet design permits casting the finished shape.

—Molybdenum dispersion - hardened and tungsten-chromium-molybdenum dispersion-hardened alloys containing no cobalt can replace the chromium-cobalt commercial magnet steels with little or no change in magnet design.

—Nickel-aluminum alloys with no cobalt or with small amounts (up to 5 per cent) of cobalt might also be substituted for the chromium-cobalt commercial alloys containing 16 per cent cobalt in applications where no forging or machining is required.

—Precipitation - hardened alloys containing 6 to 10 per cent cobalt and 16 to 19 per cent molybdenum probably can be used in place of the tungsten-cobalt commercial steels containing 17 per cent cobalt. In this case, 16 per cent molybdenum takes the place of 11 per cent cobalt.

—Various iron-nickel-aluminum alloys with no cobalt of the Mishima type might replace the tungsten-cobalt steel of commerce.

—There are few, if any, possibilities of a substitute for 35 to 41 per cent cobalt steels where machined magnets are essential. One solution might be to redesign the magnets to permit utilization of metals with lower cobalt content or one of the substitutes therefor.

—A number of possible substitutes for 35 to 41 per cent cobalt steels can be found in the Mishima-type alloys and are applicable where no

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mechanical forming is needed.

—There is no known substitute for cobalt in the extremely high performance alloys of the Alnico and the new "KS" types.

From a strategic standpoint the use of aluminum, nickel, tungsten, and chromium as substitutes for cobalt in magnets does not seem to be very logical, but the quantity of these metals that would go into magnets would be relatively small compared to the tonnages used elsewhere. On the other hand, the quantity of cobalt saved would be relatively large. Molybdenum presents no strategic problem for this country, and most attention should be devoted to that metal as a substitute for cobalt in metallurgical application.

Heat Treating Stainless

(*Concluded from Page* 84)

Izod impact curve, Fig. 9, corresponds approximately with the maximum in the breaking strength curve and in the hardness curve. These three inflections all point to a precipitation process occurring in the vicinity of 840 degrees Fahr. Such phenomena are known to induce spatial stresses and affect the Izod impact value as in the blue-brittle tempering range in carbon steels. At the same time, properties determined by the shear strength, such as hardness, were increased noticeably by the aging phenomena.

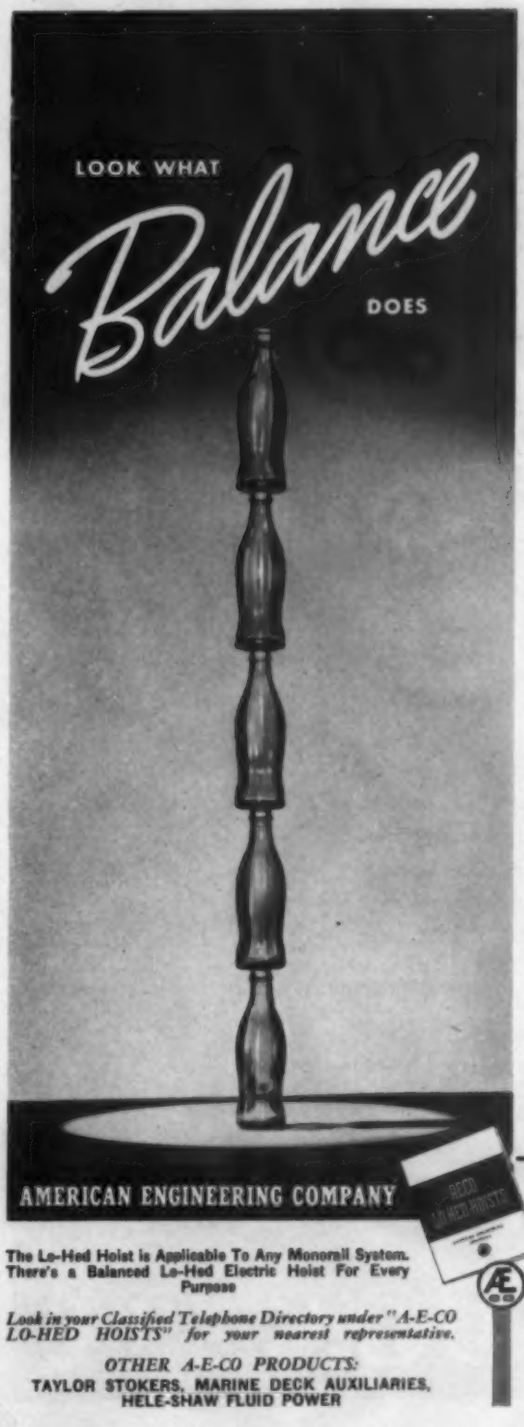
Optimum Tempering Temperature: In summarizing the breaking strength and impact tests, it should be pointed out that the "state" of the heat treated martensitic stainless steel cannot be described or specified as simply as it can for some other types of steel. For many steels, the hardness obtained after heat treatment determines the properties, but a given hardness of the martensitic stainless steels can embrace a wide range of strength and toughness properties, as was shown above.

This results from the fact that the hardness is fairly stable at all tempering temperatures up to about 930 degrees Fahr., while internal stress and temper embrittlement phenomena cause the strength properties to be highly variable at approximately the same hardness.

To specify proper tempering treatment, parts requiring high hardness along with resistance to notch-type or impact stresses would best be tempered between 480 and 570 degrees Fahr. On the other hand, the greatest breaking strength was obtained after tempering at 660 to 840 degrees Fahr. Thus these latter tempering temperatures are most suitable for parts not subjected to notch-type or impact stresses.

Tarnish Effects from Tempering and Passivation: All tempering treatments were carried out in an electrically heated circulating air furnace. Heating in air did not tarnish the original bright, oxide-free surface so long as the tempering temperature was at or below 480 degrees Fahr. Above this temperature, temper colors began to appear and it was believed that some impairment of corrosion resistance might be experienced, especially after tempering at 660 degrees Fahr. or higher.

Tests on corrosion resistance in the atmosphere and salt spray have shown that passivation in 30 per cent nitric acid at room temperature generally is desirable. It was found in the present work that the passivation treatment also was effective in removing the tarnish produced during tempering so long as the tempering temperature did not exceed 660 degrees Fahr. *Accordingly, bright hardened stainless steel may be maintained bright by this means for applications requiring either maximum impact strength (tempered at 480 degree; passivation optionable but desirable) or maximum breaking strength (tempered at 660 degrees Fahr.; passivation required).*



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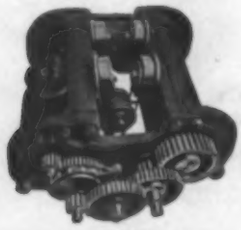

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Steel Scrap

(*Concluded from Page 98*)

trouble is being encountered in its utilization in the open hearths. The charging time is decreased because scrap is exceptionally heavy and lends itself readily to efficient filling of charging boxes since the individual pieces vary in size from those which will not pass a 1-inch mesh screen up to full charging box size.

Of further interest is the possibility of more accurate loss analysis calculations than heretofore have been possible. In calculating loss analysis, it has been impossible to make accurate determinations of the losses of free steel into the slag and oxidation into furnace gases. For the most part these two items remain the only unknowns in the loss analysis calculation since the oxide losses into slag could be determined. With a complete current production recovery and preparation operation, the loss of free metal into the slag and refuse is accurately determined, since all but very small particles of steel widely distributed into the slag are recovered.

Substantially all metallics in the material being processed are recovered. Furthermore, the recovered and prepared scrap as well as blast furnace fines arise within the respective plant. And if the furnaces are producing steels of the same general characteristics, the chemical analysis of the recovered material, within limits, is a known factor.

Due to the present scrap shortage, the recovery, and desirable preparation of steel scrap assumes an important position in the war program. A number of recovery plants have been and are being built for the Defense Plant Corp. Many steelmakers are inclined to regard this type of operation as a temporary partial relief to the scrap shortage and one which will cease after the steel and scrap industries have returned to normal. In the few individual cases of those steel plants operating relatively efficient recovery equipment, this belief may be partially justified.

However, until present steelmaking methods are changed radically, some loss of free metal in currently produced slag and refuse may be considered an inherent part of present day steelmaking operation. It has been definitely proved that the type of recovery installation, consisting of an overhead crane with magnet and bucket is a sound investment when used for the purpose of recovering that portion of the metallic loss which can be recovered by this method. It is then only logical that improvements in former methods for recovering this loss of free steel, when economically justified, should become a part of the recovery operation. On the average a steel plant recovers from 50 to 75 per cent of the free metallics lost in the slag and refuse. Even though this percentage may be higher in some cases, there are few, if any, exceptions where the installation of recovery equipment alone is not economically justified.

The Blaw-Knox Bucket illustrated is a two-line, hook-on type, 3 cubic yards capacity. It weighs 19,400 lbs. and is equipped with Chrome Nickel Moly lips cast in one piece. Its operating head room reeved with two parts of line is 16'7", with three parts of line 23'5". This and other modern Blaw-Knox buckets have progressed with steel mill practice and equipment.

BLAW-KNOX
BLAW-KNOX DIVISION
• OF BLAW-KNOX CO. •
Farmers Bank Bldg. Pittsburgh, Pa
Digging and Rehandling BUCKETS

Substitutes Plastic Rotors for Aluminum

Molded plastic vaned rotors of black phenolic resin in place of aluminum ones are now being incorporated in its Aridifiers, according to Logan Engineering Co., Chicago.

Substitution of the plastic rotors resulted from successful tests made by Charles Crofton & Co. Ltd., of Wallsend-on-Tyne, England, licensees of the Logan patents for the manufacture of Victor Aridifiers in the British Isles.

The new rotors produced by Logan will have bronze inserts in which the bearings will be mounted. The English company mounts the bearings directly in the plastic. Function of the Aridifier is to clean air or gas lines of contamination.

Advertisement JULY, 1942

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Welding With Bronze Is Fast, Economical

In these days when time- and machinery-saving methods are so invaluable, the speed and economy of bronze welding has taken on added importance.

Much less time is required for bronze welding than welding with ferrous rods because the joint is actually made by "brazing" instead of by true welding. As the bronze welding rod alloys melt at much lower temperatures than the steel, cast iron or copper to be joined, it is only necessary to bring the clean base metal to a good red heat for adhesion to take place with the molten bronze. The edges or surfaces to be joined are not melted, but are heated hot enough for the molten metal from the bronze welding rod to spread thinly over the heated surfaces with the aid of melted flux. The bronze adheres to the base metal when solidified, and more bronze is added to obtain the thickness desired. Because only local preheating is necessary in the bronze welding process, warping, cracking and changes in physical properties of the joined metals are lessened.

Despite the fact that bronze welds are usually more economical than iron or steel welds, they are considerably stronger—often, in fact, being stronger than the parent metal.

Further details on bronze welding, together with a description of Bridgeport's comprehensive line of welding rods, are contained in the booklet "Bronze Welding Alloys" which is available on request.

Memos on Brass—No. 30

The manufacture of brass products often requires one or more annealing operations. They should be carefully controlled to produce a temper that best meets the requirements of both cold working and finishing. The grain structure should be kept as fine as possible without leaving the metal too hard for further cold working. A good working knowledge of the annealing process, adequate furnaces, and equipment for cleaning the metal in acid solution and thoroughly washing it are necessary. While insufficient annealing causes difficulty during subsequent cold working, over-annealing may produce a rough surface on the finished article and may even develop small checks. The long experience of Bridgeport's laboratories is available to help fabricators achieve the best annealing results.

Pierce and Carry-Down Operations Require Care to Prevent Rupture

Correct Temper and Observance of Simple Precautions Cited as Necessary If Best Results Are to Be Obtained

Stampings, cups and shells made from sheet metal such as brass, bronze or copper are both very strong and serviceable. They are also extremely economical in regard to the weight of metal used. Nevertheless, thin walls present a problem when it is necessary to attach a screw and the wall thickness is not sufficient for threading. Also, sometimes it is required to solder a tube to the part, and here again the thin wall does not offer much support.

"Drifting" Operation

Metal workers get around this situation by piercing a smaller hole than the intended finished diameter and carrying down the metal to form a shoulder, by means of a punch and die. This operation is sometimes called "drifting." If the metal is not thick enough for a cut thread, a rolled thread is sometimes made.

Preventing Cracked Edges

Where only a slight draw-down section is required, half-hard material (rolled 2 Nos. B & S hard) will prove satisfactory. For deeper draw-downs, the bottom edge will crack or tear. Slight cracks are not objectionable for most conditions.

Where it is essential that breaks be avoided entirely, special precautions should be taken, such as using soft or annealed metal instead of half-hard or hard. Piercing the hole may be the source of the trouble because the piercing operation cuts the metal by pushing the top section and breaking off the bottom one, thus hardening the edge of the pierced hole. When the punch (larger than the pierced hole) pushes through the metal, it naturally stretches the hole and breaks will occur if sharp edges are present. Reaming the hole before drifting will cut off the sharp edges and burrs, and fracture is not apt to occur if the draw-down is short. Piercing the hole in one direction and drifting the metal in the opposite direction may be helpful.

A side outlet made by piercing and carrying down the metal.

For a deep draw-down, it may be necessary to either anneal the metal locally or entirely after the piercing operation, or possibly add an extra drifting operation. Spot or local annealing is expensive and it is sometimes more practical to first bump or draw the metal, then pierce it and follow up by the drifting or carry-down operation.

Cupping and Drawing Of Brass Not Difficult

Fabricators who are faced with the problem of cupping or deep drawing brass for the first time will not find these processes difficult, provided that they use brass of the correct temper, properly designed tools and the right lubricant.

One of the difficulties encountered in drawing brass, namely, retention of metal during cupping, can often be eliminated by careful lapping of the die and punch and the removal of sharp corners.

In cupping brass, the following are a few of the precautions that should be observed: die radii should be relatively large, highly polished in the direction in which the metal is flowing, and free from scratches; holding surfaces should be polished or lapped; pressure should be sufficient to prevent wrinkling and equalized on holding surfaces.

Heavy gauge metal, such as .040 or heavier, generally requires a heavy lubricating oil, such as lard oil or lard oil diluted with other lubricating oils. Lighter gauge metals, .025 or lighter, take lighter lubricants, such as soap water made up from soap chips.

In the selection of brass, too soft a metal should be avoided because it may produce a rough cup which may break off at the corners. A fine-grained brass, resulting from a low temperature anneal, is best where the metal is shaped without appreciable reduction in gauge at the wall of the cup, since this operation requires a very strong metal.

COPPER ALLOY BULLETIN

ALLOYS OF COPPER

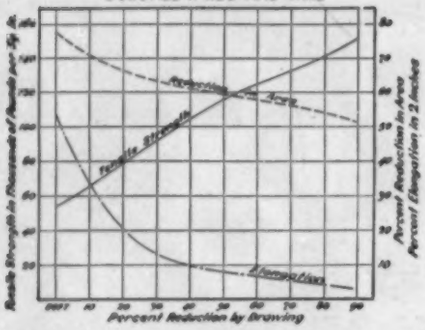
This is the thirty-fifth of a series of articles on the properties and uses of the copper alloys.

COPPER-SILICON ALLOYS

In the June issue of the COPPER ALLOY BULLETIN, the properties and applications of an alloy containing 98% copper and 2% silicon, which is commercially known as Duronze* V, was discussed in this column. This alloy is characterized by moderate tensile strength in the annealed condition and surprising malleability in the hard drawn condition.

This month we will discuss the characteristics of an alloy, commercially known as

COLD DRAWING CHARACTERISTICS OF DURONZE II ROD AND WIRE

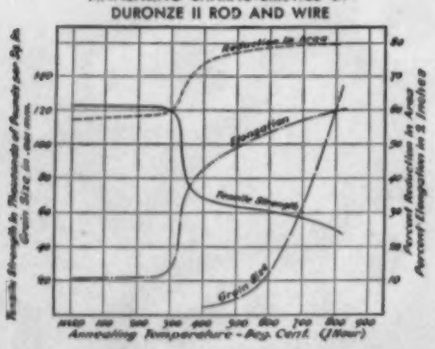


Duronze II, which contains approximately 97% copper and 3% silicon.

As is to be expected, the additional silicon content in Duronze II causes greater hardness and strength with reduced malleability. When annealed at 650° C., Duronze II has a tensile strength slightly under 60,000 lbs. per sq. inch as compared to approximately 44,000 lbs. per sq. inch for Duronze V. Its strength in the annealed condition, therefore, compares favorably with low carbon steel. In Duronze II a copper alloy is pro-

(Continued in column 2)

ANNEALING CHARACTERISTICS OF DURONZE II ROD AND WIRE



In huge arc-fired kettles such as this Bridgeport is producing high copper alloys for planes, tanks, guns, ships and other instruments of destruction to help America defend her priceless freedom. Every iota of Bridgeport's skill and experience, as well as every moment of its time, is marshalled to the making of copper and copper alloys for victory.

ALLOYS OF COPPER

(Continued from column 1)

duced that is both tough and non-rusting, one that lends itself ideally to the manufacture of small tanks and structural members where the strength of steel and the corrosion resistance of bronze are required.

Cold rolled Duronze II sheet and strip of spring temper is used as a substitute for Phosphor Bronze spring metal for making flat springs for electrical switches and contacts. Duronze II can be either hot or cold rolled, or hot or cold forged. It has comparatively high electrical resistance and can be readily spot, seam or gas welded. The physical properties and characteristics of Duronze II are as follows:

PHYSICAL PROPERTIES OF DURONZE II

Condition	Tensile Strength Lbs. per Sq. In.	% Elong. in 2"	% Red. Area
Sand Castings	40-50,000	30-40	40-50
Annealed Sheet and Rod	50-60,000	45-55	55-65
Hot Rolled Sheet and Rod	50-60,000	45-55	55-65
Hot Forgings	55-65,000	40-50	50-60
Hard Drawn Rod	70-110,000	10-25	50-60
Cold Rolled Sheet 4 Nos. Hard	90,000	15-25	50-60

PHYSICAL PROPERTIES OF DURONZE II COMPARED WITH COPPER

Properties	Duronze II	Copper
Melting Point	1025° C.	1083° C.
Density at 22° C.	8.55	8.94
Weight per Cu. In. in Pounds	.309	.3229
Electrical Conductivity	6.95%	97.5%
Electrical Resistivity Ohms per Mil. Foot	159	10.64
Coeff. of Linear Expansion per degree F.	0.0000093	0.0000094
Thermal Conductivity (Approx. % of Copper)	9	100
Tensile Strength Lbs. per Sq. In.—Hard Drawn	90,000	45,000
Tensile Strength Lbs. per Sq. In.—Annealed	55,000	34,000
Modulus of Elasticity	15,000,000	16,000,000
Magnetic Properties	None	None
Rockwell Hardness—Hard Drawn	95	50
Rockwell Hardness—Annealed	50	F40
Duronze II Weighs 4% Less than Copper		
Duronze II Sand Castings		
Tensile Strength	40,000	22,000
% Elong. in 2"	30	35

NEW DEVELOPMENTS

A machine tool vise available in stationary or swivel design has been announced which attaches to a machine tool table with T-bolts and has a ½-inch wide T-slot tongue. Hardened jaws are 1⅛ inches deep and 3¼ inches wide. Maximum opening is 2 inches. Handle is arranged for high speed opening and closing. **(No. 340)**

Double duty washers have been developed which are said to save time, money and vital materials. One of these washers, the maker states, replaces flat and ordinary lock washers in all bolted assemblies. The broad surface is said to afford adequate bearing surface for all requirements and the unique design assures uniform tension. **(No. 341)**

An illuminated magnifier which weighs only 17 ounces has been developed for inspection purposes. The maker claims it can be used almost as easily and flexibly as an ordinary magnifying glass. Lenses available give double and triple magnification. **(No. 342)**

A lubricator for air-driven equipment has been designed to operate in any position in the air line convenient for visibility. It requires only a single regulating valve, and oil is added by removing a simple screw plug at the top. Available in 4/5 pint and quart sizes, the lubricator can be regulated to drop as few as five drops of oil per minute. It can be installed in an ordinary tee in the air line. **(No. 343)**

Power squaring shears, having capacities ranging from 12-gauge to 3/16-inch steel and handling cutting lengths from 4 to 12 feet, have been developed. Features include precision cutting, both as to straightness and parallelism; ball bearing, self-measuring parallel back gage with settings to 1/128 inch; speed of 65 strokes per minute; and flat, straight shearing of narrow strips. **(No. 344)**

A new torsion-testing machine for wire samples to 5.8 inch diameter by 16 inches in length has been developed. The machine applies a motor drive at one end of the sample for twist rotation, while the opposite end is held stationary. The rotating and non-rotating heads are fitted with key-operated checks to hold the test piece. One head is movable along the machine base, the other connects to a speed reducer driven by the motor, a two-speed unit for chuck rotation at 13 to 26 r.p.m. **(No. 345)**

A floating lamp has been announced which is said to require no adjustment, no screws, no time out to adjust lights. It is claimed that a touch will move the reflector to any desired point within a horizontal plane 6 feet in diameter and a vertical circle of 5 feet. Clamps or screws anywhere. Made in incandescent and fluorescent models. **(No. 346)**

This column lists items manufactured or developed by many different sources. Further information on any of them may be obtained by writing Bridgeport Brass Company, which will gladly refer readers to the manufacturer or other source.

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT, CONN.—Branch Offices and Warehouses in Principal Cities

SHEETS, ROLLS, STRIPS—*Brass, bronze, copper, Duronze**, for stamping, deep drawing, forming and spinning.

CONDENSER, HEAT EXCHANGER, SUGAR TUBES—For steam surface condensers, heat exchangers, oil refineries, and process industries.

PHONO-ELECTRIC* ALLOYS—High-strength bronze trolley, messenger wire and cable.

WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.

"Bridgeport" BRASS CO.

Established 1865

COPPER WATER TUBE—For plumbing, heating, underground piping.

DURONZE ALLOYS—High-strength silicon bronzes for corrosion-resistant connectors, marine hardware; *hot rolled sheets* for tanks, boilers, heaters, flues, ducts, flashings.

BRASS, BRONZE, DURONZE WIRE—For cap and machine screws, wood screws, rivets, bolts, nuts.

FABRICATING SERVICE DEPT.—Engineering staff, special equipment for making parts or complete items.

BRASS AND COPPER PIPE—"Plumrite"* for plumbing, underground and industrial services.

*Trade-name.

BRIDGEPORT BRASS

Spoon Test

(*Concluded from Page* 108)

ations in the surface tension, are given prominence in the film, so that the student trained by this system will not be put to practical difficulties in recognizing what has occurred. As an illustration of this, instances appear where the small scales combine as mentioned, until ultimately, the surface tension seems to be altered, as the metal tends to dampen the slag on the spoon. When such arises, some slight skull may develop on the lip of the spoon, and the final drop of metal may appear to drag. In other examples, phenomena such as freely running metal changing is apparent and surface tension and developing a meniscus which turns up are also revealed.

Reasons given in practice for this state of affairs are that the charges have been unusually low in oxide, and that a certain crystallization has occurred throughout what liquid remains from some that has become undercooled. The same respect is not given nowadays to examining spoon samples which have been allowed to lie until completely set in the spoon, and noting the time occupied. This is because although suitable for dead steels, others would boil over the sides, or produce disturbances of the surfaces, whereby any readings taken would be rendered inaccurate. In a similar manner, the method of withdrawing the sample, and instead of pouring out, skimming off the slag, and taking a pyrometric reading has more or less been abandoned.

The reason for this is that different oxide films are stated to possess varying emmissivity to that of the clean metal first exposed, which results in a false reading, depending upon how readily becomes the establishment of the oxide film. Instead of having to spend lengthy periods examining spoon samples, the idea of instituting the movie film projection is that almost the whole study can be revealed in great detail with the greatest rapidity, since different hearths and methods of working charges are selected by authorities before commencing. This system of training would have been introduced much earlier, but it was almost invariably considered that alternative methods of examining the temperature and fluidity would be substituted, without having to depend upon the spoon test.

Norton Book Deals with O. D. Grinding Technique

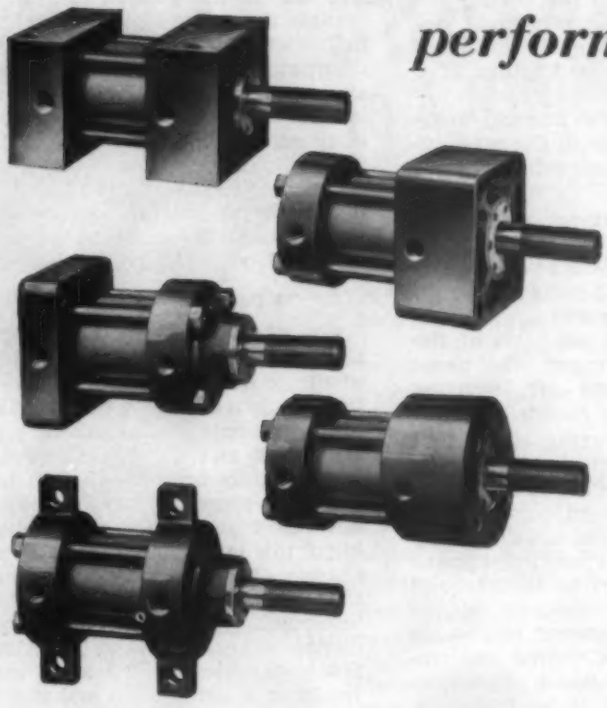
Norton Co., Worcester, Mass., announces a new book on modern machine shop practice, entitled *The ABC of O. D. Grinding*. The abbreviation "O. D." is of course the common machine shop expression meaning the outside diameter of a cylindrical piece of work.

This book is 5 x 7 inches in size and contains 38 pages with 18 illustrations. It includes 4 pages of tables. At the beginning there is explanatory material covering the design and functions of center-type and centerless grinding machines of standard type. This is illustrated by photographs of each type of machine, indexed by arrows to each important point in operation and control.

In addition to this "know your grinding machine" section, chapters are devoted to selection and mounting of wheels under various work conditions; operating tricks that increase production; and reasons for the various grades of wheels in connection with different types of work. Considerable attention also is given to the truing and dressing of wheels in service.

Copies of this book are available from the Norton Co., to applicants who furnish satisfactory evidence that they are actively concerned with setup and operation of O. D. grinders in industry.

Accurately machined for mounting as well as for *performance*



on (T-J) Hydraulic Cylinders...

- The mounting surfaces are parallel with (or at right angles to) the bore of the cylinder.
- All surfaces are as square and smooth as is warranted.
- All mounting holes are drilled—not just cored.

This workmanship makes for better installation, admirable appearance on the job and what is better yet, of course, insures a longer life of more efficient performance. Catalog sent upon request.

THE TOMKINS-JOHNSON CO.

611 NORTH MECHANIC STREET JACKSON, MICHIGAN

WLB Panel's Findings

((*Concluded from Page* 50)

ings in all manufacturing but in both cases the percentage difference will be less than it was in the past."

11. "The panel finds that for the year 1942 weekly earnings in durable goods will probably be substantially greater than weekly earnings in the steel industry whereas in March, 1941, they were slightly less. Weekly earnings in all manufacturing will probably be in the neighborhood of weekly earnings of steelworkers whereas in March, 1941, they were substantially less."

Wages Advanced in 1941

12. "The wage rates in the steel industry advanced 10 cents an hour on April 1, 1941. Giving effect to this advance, the panel further finds that:

"(d) From April, 1941 to March, 1942, the cost of living in steel towns advanced 13.3 per cent.

"(e) Over the same interval, average weekly earnings in the steel industry decreased a fraction of 1 per cent.

"(f) Over the same interval, average hourly earnings in the steel industry advanced approximately 3.2 per cent."

13. "On the presumption that the present policies of price freezing of most goods, rationing of scarce goods and control of rents in defense areas will continue and prove effective, and solely on the basis of the material in the record, the panel has allowed nothing for increases of living costs after March 15, 1942."

14. "The panel further finds that the country is committed to fighting inflation on a seven-point front, that one of the seven points is the stabilization of wages and that every wage increase has an inflationary effect proportionate to its size and base."

"The 'national income' represents the total sum distributed to individuals plus a sum which represents business savings. It is, therefore, the whole dividend of the nation after the subtraction of depreciation and corporate taxes. For the years 1939 to 1941, the total compensation of the employes has represented between 68 per cent and 68½ per cent of the national income. Labor's proportion has, in other words, remained practically constant. An important shift in the allocation of the national income would, at this time, justly cause concern. . . .

"The panel does not, however, intend to imply that a technique of forced savings can properly be worked out in the course of adjusting labor disputes."

15. Many workers (50 per cent of Bethlehem's; 20 per cent of Republic's) are paid on a piece rate or incentive basis, rather than solely on an hourly rate basis. Some days their piece rate earnings do not equal the guaranteed hourly wage multiplied by the number of hours worked. Other days they earn more than the guaranteed minimum. Bethlehem and Republic guarantee these workers that their daily wage will equal the minimum when averaged over the pay period, which varies from one to two weeks. The union requests that they pay the guaranteed minimum as of each day. Youngstown and Inland are either complying with the union's request or are willing to comply.

16. The panel finds that: "The workers desire the change requested. The union represents the employes and its word should be accepted as to their wishes. Granting the request would involve no direct additional cost to the companies." Since no wage increase is intended, there is no reason for retroactive adjustment, the panel found.

If the board grants the union's request the panel suggests that the Bethlehem and Republic companies negotiate with the union regarding any changes that need to be made in the incentive, tonnage or piece work rates, "on the assumption that the companies will have to bear no direct, additional cost, and that the steelworkers' pay for performing a given quantity and type of work shall not be increased."

30 Per Cent Won't Join

17. "Somewhere in the neighborhood of 30 per cent of the employes of the four companies . . . have refused to join the union notwithstanding arguments of the union's representatives and the pressure which has certainly been brought to bear. However cogent the union may believe the reasons to be which should impel this large body of employes to change their position, the fact is that there does not appear to be any immediate method of voluntarily inducing them to do so . . . Relatively few companies in the steel industry have a union shop and if a calculation were made on the basis of the number of employes, the pattern of the industry must be described as definitely open shop."

18. "Neither the panel nor the board need weigh the union's demand for a union shop, for . . . Mr. Murray, speaking for the union, expressed his willingness to negotiate some form of union security which would modify the union shop demand and later passages in the record indicate that some type of maintenance of membership would be acceptable."

19. The companies argued that: "The union security problem was solved during the first World War by freezing shop conditions as they then existed. A similar policy should be pursued today." The panel "doubts the accuracy of historical analogies in general and of this one in particular."

The panel finds that: "Normal dues collection involves a salutary control over union leaders . . . The checkoff, if generally adopted, would involve large sums of money not publicly accounted for."

Find "Maintenance" Desirable

20. "Supplementing and amplifying findings already made, the panel finds that: (1) Labor unions, generally, perform an important social function; (2) the functions of this union, in particular, are today of vital significance and its maintenance is socially desirable; (3) should union men decide to remain union members, knowing that such decision meant that their employment, for a fixed term, would be conditioned on their continued membership, they would voluntarily be assuring the maintenance of the union; (4) neither violation of personal liberty nor questionable conduct can be inferred when men voluntarily restrict their normal rights, for a limited time, to further a socially desirable end; (5) union security, in the form of maintenance of membership, united with the checkoff, would—(a) make shop conditions more peaceful by diminishing friction and eliminating the solicitation of dues, (b) reduce the cost of dues collection and benefit the union accordingly, (c) release the time of union officials and thus permit frequent contact with both union membership and management addressed to the elimination of grievances and to a concerted effort to achieve maximum production; (6) The friction caused by collection of dues indicates that, if the board determines that maintenance of membership should be granted, the necessity of resolicitation of the existing membership should be avoided.

"The panel suggests that maintenance of membership and the checkoff, if granted, should apply only to those employes who are members in good standing of the union, at a date which shall be a brief period, such as a fortnight, after the board advises the union members of its ruling. The ruling, if made, should apply to those who become members of the union thereafter.

"The industry member dissents to the foregoing section entitled 'Union Security' upon the ground that he does not believe union maintenance should be imposed in these cases.

"The labor member dissents to the foregoing section entitled 'Union Security' upon the ground that he finds the facts in these cases warrant complete union security in the form of the union shop."

Wing Tips

(*Concluded from Page 68*)

cell, a collapsible tank of synthetic rubber, in conventional types of carriers—trucks, wood barges, box cars, etc. This cell was developed five years ago as an airplane fuel tank for wing installation, acting much as a football bladder does when filled with air, billowing out to fill whatever space it occupies. It was the prototype, so to speak, of the present self-sealing fuel tank installed in the wings of all combat planes, and is made by the United States Rubber Co.

Interesting feature of the tanks is that, after carrying fuel to its destination, they may be rolled up into compact packages and expressed back, making the carrier available for return freight. In application to petroleum transport the tanks show promise in using less-than-carload space which otherwise might remain empty in transit. All that is needed is proper support for the cells at the sides, and wood can be used in partitioning the loads. R. B. Gray, chief of the Martin laboratories, and his staff have been active in tests now under way looking toward adapting the Mareng cell to fuel transport.

Mirrors of Motordom

(*Concluded from Page 64*)

waves will have a clear channel. This turntable has an arc of 360 degrees, giving maximum coverage in any given area.

The noise is created by a high-frequency disturbance of air, achieved by means of a "chopper" 25 inches in diameter, revolving with the minimum possible clearance across the openings of six rectangular throats. These in turn connect with the horn. Compressed air, under 5 pounds pressure at the rate of 2500 cubic feet per minute, is introduced behind the chopper. As the compressed air rushes towards the six vents, it is "chopped" off by the revolving blades, thus setting up the vibrations which cause the noise. The chopper revolves at 4400 r.p.m. producing a frequency of 440 cycles per second in the interruptions of the air's escape.

Operating at full throttle, the siren produces 170 decibels of sound at the throat, diminishing to 140 at a distance of 100 feet. Scientists estimate 190 decibels of sound as the maximum produceable by any mechanical means, which would mean the continuing instantaneous interruption of full atmospheric pressure.

The engine operating the blower, siren and turntable, is a standard Chrysler 8-cylinder type, governed to 3600 r.p.m., but a planetary step-up type transmission raises this to 4400 r.p.m. for the blower and modulator drive. Radiator, fuel tank, ignition system, starting motor and battery are complete with the engine.

Engine and transmission are connected by a Chrysler fluid drive unit of the same type used in passenger cars. The blower unit is of the centrifugal two-stage type, rotors balanced for all dynamic forces. Compressed air from the blower is carried by a short duct to the side of the housing in which the chopper revolves.

Controls are centralized and easily accessible from the under side of the turntable platform. They include ignition switch, oil gage, ammeter and engine temperature gage. A central control device can operate all the sirens in a given area if desired. One marked advantage of this type of siren is that it reaches full power in a few seconds. Tests have shown that the piercing shriek emitted by this siren can be heard as far as 8 miles under neutral wind conditions.

Chrysler also will produce a siren of the same general design as that described, but driven by a 6-cylinder 120-horsepower engine. This model will be adaptable to a portable mounting.

HOW TO REDUCE SHUTDOWNS TO A MINIMUM

2 broken arms of 70 ton riveter Frame repaired by Thermit Welding.

Breakage of heavy equipment is at its peck, as industry strains to get every ounce out of its production facilities.

Fortunately there is a quick remedy in Thermit welding. The heaviest of parts can be repaired on your own grounds in a few days—a fraction of the time required by any other method.

A Thermit weld has the strength of forged steel, a fact proved by many destruction tests where breakage almost invariably occurs elsewhere than in the weld itself.

Thermit Welding is also used to great advantage in the fabrication of heavy units where the welding of relatively small castings, forgings or flame cut shapes, in place of large intricate castings, speeds up production.

Send for booklet

THERMIT WELDING

Specialists in welding for nearly 40 years. Manufacturers of Murex Electrodes for arc welding and of Thermit for repair and fabrication of heavy parts.

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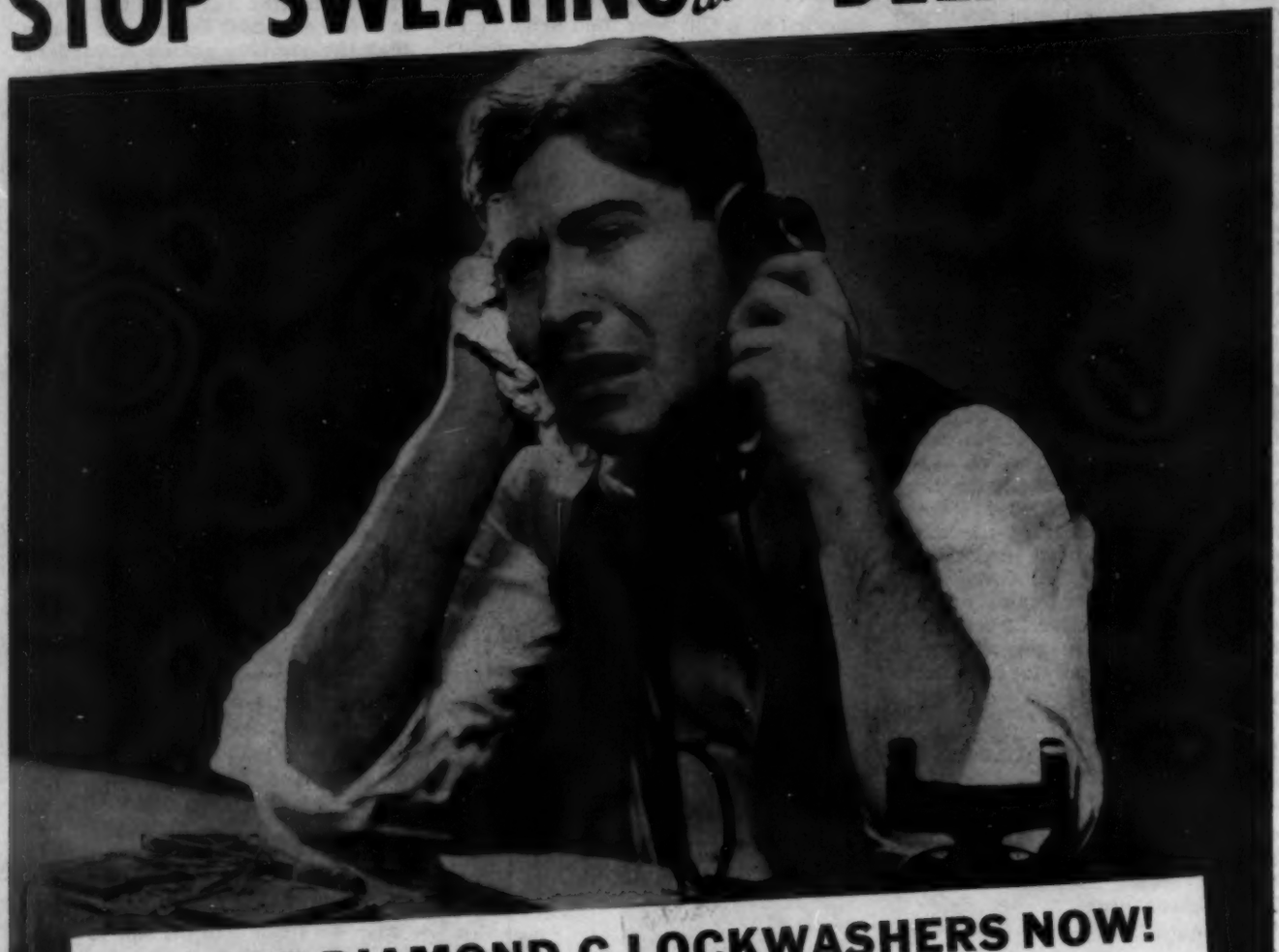

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DIAMOND G LOCKWASHERS

MARKET SUMMARY

DEMAND

Heavy at highest ratings for war products and lend-lease.

PRODUCTION

Declined 1 point to 97½ per cent of capacity.

PRICES

Ceiling quotations continue unchanged on all products.

New Ratings To Disentangle Priorities

Designations supersede former classification to provide better distribution . . . Lend-lease tonnage burdens mills . . . Scrap shortage looms, with current supply barely sufficient

AS a means of untangling the situation resulting from an excess of A-1-a priorities, on which had been superposed a mass of allocations and directives, the Director of Industry Operations has issued a new priorities regulation providing a series of preference ratings, designated as AAA, AA-1, AA-2 etc., all taking precedence over A-1-a. The previous highest rating, AA, has been abolished and all orders bearing this designation will become AA-2.

Orders now bearing A ratings will be rerated under the higher preferences, to apply to definite quantities of military and non-military items. The plan is designed to produce a balanced program of most urgent war materials at the expense of ratings for other war materials and essential civilian products.

Application of the new ratings is expected to be made slowly to cause as little disruption as possible. With the heavy load on mills this plan is welcomed as at least a partial solution. Probably not much effect will be apparent on shipments in July. It means that some holders of A-1-a ratings will not get steel that might have been delivered under the former plan. The volume of steel orders under allocations and priorities is estimated at double what it was in May and will total about 90 per cent of July deliveries. The remaining 10 per cent will go to highest rated orders, probably not lower than AA-2.

* * *

Allocation of heavy lend-lease tonnage for third quarter is disrupting rolling schedules, tonnage being much larger than heretofore, and as it is mainly in semifinished it is interfering further with operation of finishing mills. The latter have been hard pressed to maintain production in some lines and diversion of this steel will complicate the situation. Allocations are definite but specifications have not been filed. As rolling schedules are frozen for two weeks it appears that the lend-lease tonnage will not be included before the middle of July. Some intimation has been given that part of the semifinished may be respecified as finished steel, which would be a gain to finishing mills.

Manufacturers of war goods are handicapped by inequalities in parts supply, a result of the tight steel situation, often lacking some part necessary for completion of products. Farm implement manufacturers are having trouble maintaining their quotas of needed agricultural machinery because of slow delivery of light shapes and alloy and carbon rounds.

Steelmaking was little affected by the Independence Day holiday at the weekend. Operations declined 1 point to 97½ per cent, partly due to lack of scrap and necessity for furnace repair. A year ago the corresponding week showed a drop of 7½ points, mainly from observance of the holiday. Wheeling advanced 4 points to 83½ per cent and Cincinnati 2 points to 91 per cent. Pittsburgh dropped 1½ points to 94, Detroit 1 point to 91, Buffalo 2½ points to 90½, Cleveland 2 points to 92 and New England 5 points to 95. Rates were unchanged at Chicago, 103; Eastern Pennsylvania, 96; St. Louis, 95½; Birmingham, 95; Youngstown, 95.

* * *

Indications multiply to support the expectation of further scrap shortage in later months this year. Increased collections resulting from special drives have sufficed to keep steelmaking at a high rate but the larger volume is barely being maintained and in some areas receipts are not sufficient to allow capacity production. A number of open hearths are idle and in some cases small reserves accumulated in recent weeks are being depleted. Efforts to salvage everything available are being continued and suggestions have been made for taking over numerous sources heretofore not touched, such as ornamental iron and steel fences. Abandoned street car rails are being taken up in various centers and some elevated railway structures are being earmarked for demolition. With furnaces consuming all current tonnage the outlook for fall and winter months is far from good.

Composite steel and iron prices are maintained unchanged at levels prevailing for several months, under ceilings of Office of Price Administration. Finished steel composite is $56.73, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap at $19.17.

COMPOSITE MARKET AVERAGES

	July 4	June 27	June 20	One Month Ago June, 1942	Three Months Ago April, 1942	One Year Ago July, 1941	Five Years Ago July, 1937
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.18
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.84
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	18.70

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	July 4, 1942	June 1942	Apr. 1942	July 1941
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.49	2.49	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.22	2.22	2.27
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	July 4, 1942	June 1942	Apr. 1942	July 1941
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$25.34
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.39	25.39	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	24.06
No. 2X, del. Phila. (differ. av.)	26.215	26.265	26.265	26.215
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.54	31.54	31.54	31.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.65	140.65	125.63	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	17.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	21.50

Coke

Connellsville, furnace, ovens	$6.00	$6.00	$6.00	$6.25
Connellsville, foundry, ovens	7.25	7.25	7.25	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942 The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh base, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bil.) $36.00.
(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under lease-lend during first quarter 1942 at $37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs $41 gross ton at established basing points.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.25; Duluth, $42.00.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel sheet bars at $39 gross ton, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.
Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.27. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c Pac. ports, dock 2.50c; all rail 3.25c. (Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.) Joslyn Mfg. Co. may quote 2.35c, Chicago base.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c Detroit, del. 2.82c.

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	5100 Spr. flats	0.15
2100	0.75	5100 80-1.10 Cr	0.15
2300	1.70	6100 Bars	1.20
2500	2.55	6100 Spr. flats	0.85
3100	0.70	Carb., Van.	0.85
3200	1.35	9200 Spr. flats	0.15
3300	3.80	9200 Spr. rounds, squares	0.40
3400	3.20		
4100 .15-25 Mo. 46.00 .20-.30 Mo. 1.50-2.00; Ni.	0.55 1.20	T 1300, Mn, mean 1.51-2.00	0.10
		Do., carbon under 0.20 max.	0.35

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.47c.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.27c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila. del. 2.28c; New York del., 2.35c Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.17c; New York del. 3.41c; Phila. del. 3.39c; Pacific ports, 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c Phila. del. 3.68c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage,

base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.
Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.22c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)
Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.92c; Worcester base 3.00c.
Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.
Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.
Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.
Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.
Manufacturing Ternes: Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.
Roofing Ternes: Pittsburgh base per package 112 sheets, 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.47c.
(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. may quote plates at 2.20c, f.o.b. basing points.)
Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.
Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.
Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c; Phila., del., 2.22c; Gulf ports, 2.47c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points.)
Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c
Wire Products to the Trade:	
Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	67
Do., 11 gage and heavier	70
Barbed wire, 80-rod spool, col.	70
Twisted barbless wire, col.	70
Single loop bale ties, col.	59
Fence posts, carloads, col.	69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

	Butt Weld				
	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
⅝	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

	Lap Weld				
	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

		—Seamless—		—Lap Weld—	
O. D. Sizes	B.W.G.	Hot Rolled	Cold Drawn	Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.
High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1	..	67.00c
18.00	4	2	1	77.00c
18.00	4	3	1	87.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	‡‡18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.
Extras mean additions or deductions from base prices in effect April 16, 1941.
Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.
Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin of shipment.
Dislocated tonnage: Producers shipping material outside their usual marketing areas because of the war emergency may charge the basing point price nearest place of production plus actual cost of transportation to destination.
Seconds or off-grade iron or steel products cannot be sold at delivered prices exceeding those applying to material of prime quality.
Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941. Domestic or export extras may be used in case of Lease-Lend tonnage.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

⅛ x 6 and smaller	65½ off
Do., ⅜ and ⅞ x 6-in. and shorter	63½ off
Do., ⅝ to 1 x 6-in. and shorter	61 off
1¼ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex.	U.S.S.	S.A.E.
⅞-inch and less	62	64
⅛-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	$6.00
Connellsville, foundry	7.00- 7.50
Connellsville prem. fdry.	7.25- 7.60
New River, foundry	8.00- 8.25
Wise county, foundry	7.50
Wise county, furnace	6.50
By-Product Foundry	
Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do. less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls. to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.00

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.65	.....	.....	28.15
Birdsboro, Pa., del.	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	.....	.....
Baltimore, del.	25.67	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	‡24.47	.....	.....	.....
Cincinnati, del.	24.30	22.92	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.24	.....	.....	.....
Philadelphia, del.	25.51	25.01	.....	.....
St. Louis, del.	‡24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38	.....	.....	27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50	.....	25.00	24.50
St. Paul, del.	26.76	.....	27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.68	24.68	.....	25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	.....	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	26.05	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39	.....	26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$28.00
Chicago, del.	31.54

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$23.50
Valley, base	23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942.

Export Prices: In case of exports only, the governing basing point nearest point of production may be used, plus differentials and export transportation charges.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick	
Super Quality	
Pa., Mo., Ky.	$64.60
First Quality	
Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00
Second Quality	
Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00
Malleable Bung Brick	
All bases	$59.85
Silica Brick	
Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30
Ladle Brick	
(Pa., O., W. Va., Mo.)	
Dry press	$31.00
Wire cut	29.00
Magnesite	
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Basic Brick	
Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$23.00-25.00
Do., barge	23.00-25.00
No. 2 lump	23.00-25.00

(OPA May 11 established maximum at Jan. 2, 1942, level.)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.65; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36.

Manganese Briquets: Contract basis in carloads per pound, bulk freight allowed 5.50c; packed 5.75c; ton lots 6.00c; less-ton lots 6.25c; less 200-lb. lots 6.50c. Spot prices ¼-cent higher.

Electrolytic manganese: 99.9% plus, less carlots, per lb. 42.00c.

Chromium Metal: Per lb. contained chromium in gross ton lots, contract basis, freight allowed. 98% 80.00c. 88% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50c	20.25c	20.75c	21.00c
1% C.	20.50c	21.25c	21.75c	22.00c
0.20% C.	21.50c	22.25c	22.75c	23.00c
0.10% C.	22.50c	23.25c	23.75c	24.00c

Spot is ¼c higher

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

Molybdenum Powder: 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

Spot prices ¼-cent higher.

Silicon Metal: Contract basis per lb., f.o.b. producers' plants, freight allowed; 1% iron; carlots 14.50c, ton lots 15.00c, less-ton lots 15.25c, less 200 lbs. 15.50c.

Silicon Metal: Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

Silicon Briquets: Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Contract basis freight allowed, 1½% carbon; in carloads per gross ton $128; ton lots $140.50. Spot $5 per ton higher.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot 5 cents per lb. higher.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, Contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producer's plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents per pound higher.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) Contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ½-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.50c; ton lots

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	Soft Bars	Hot-rolled Strip Bands	Hot-rolled Strip Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets Hot Rolled	Sheets Cold Rolled	Sheets Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars Carbon	Cold Drawn Bars S.A.E. 2300	Cold Drawn Bars S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.68	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.04	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.37	4.92	3.45	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.50	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.38	4.23	4.98	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Chattanooga*	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	5.25	5.00	4.60	....	....
Houston, Tex.	3.75	4.30	4.30	4.05	4.05	5.50	4.00	....	5.25	....	6.90	....	....
Seattle	4.20	4.25	5.45	4.75	4.45	6.50	4.65	7.60	5.70	....	5.75	....	....
Los Angeles	4.50	4.95	6.80	4.50	4.50	6.75	4.65	6.50	5.85	....	6.10	10.55	9.55
San Francisco	3.95	4.50	6.25	4.65	4.35	6.35	4.55	6.40	6.10	....	6.80	10.80	9.80

*Not named in OPA price order.

	S.A.E. Hot-rolled Bars (Unannealed) 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.25	....	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	8.80
San Francisco	5.45	9.80	8.80	8.65	9.05

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in B'ham., Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities, New Orleans; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-10,000 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 500-999, Los Angeles, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	L	s	d
Merchant bars, 3-inch and over	$66.50	16	10	0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20	0	0
Structural shapes	2.95c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 24 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1	10	9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		L	s	d
Foundry No. 3 Pig Iron, Silicon 2.50-3.00	$25.79	6	8	0(a)
Basic pig iron	24.28	6	0	6(a)
Furnace coke, f.o.t. ovens	7.56	1	17	6
Billets, basic soft, 100-ton lots and over	49.37	12	5	0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14	10	6
Merchant bars, rounds and squares, under 3-inch	3.17c	17	12	0††
Shapes	2.77c	15	8	0††
Ship plates	2.91c	16	3	0††
Boiler plates	3.06c	17	0	6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22	15	0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26	2	
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23	15	0
Bands and strips, hot-rolled	3.30c	18	7	0

(a) del. Middlesbrough. 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi bessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.30

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

Gross ton c.i.f. Baltimore; dry basis; subject to penalties for guarantees

Indian and African, 2.8:1 lump, 48%	$39.00
South African (excluding war risk)	
No ratio lump, 44%	28.00
Do. 45%	29.00
Do. 48%	34.00
Do. concentrates, 48%	33.00
Do. 50%	34.00
Brazilian (nominal)	
2.5:1 lump, 44%	28.50
3:1 lump, 48%	38.00

Manganese Ore

(Nominal)

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	
S. African, 48%	80.00-86.00
Indian, 50%	80.00-86.00
Brazilian, 46%	78.00-84.00
Cuban, 51%, duty free	85.00
Domestic, 48%, f.o.b. mines	$1.00

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

				ELECTRIC FURNACE AND FOUNDRY GRADES										
				Low Phos. Grades										
	OPEN HEARTH GRADES*	Machine Shop Turnings	BLAST FURNACE GRADES*	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	Heavy Structural, Plate 2 ft. and less	Heavy Structural, Plate 1 ft. and less	Cut Auto Scrap 3 ft. and less	Cut Auto Scrap 2 ft. and less	Cut Auto Scrap 1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$16.00	$16.00	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Bethlehem	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Buffalo	19.25	15.25	15.25	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	15.50	15.50	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Detroit	17.85	13.85	13.85	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo	.....	13.85	13.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Kokomo	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth	18.00	14.00	14.00	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
St. Louis	17.50	13.50	13.50	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	13.00	13.00	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle	14.50	10.50	10.50	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	21.00	22.00	23.50	24.00	24.25	24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	17.50	18.50	19.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

***Open Hearth Grades** refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, tube scrap $3 over, auto springs, crankshafts, $1 over No. 1 heavy melting. **Blast Furnace Grades** refer to mixed borings and turnings, shoveling turnings, No. 2 busheling and cast iron borings.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, provided most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $2.50 less (railroad grades $3.50 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Graveyard autos not considered unprepared scrap.

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price. Colorado scrap is remote scrap for Colorado consumers only.

LOGEMANN
Presses for Sheet Scrap

THE NATION NEEDS YOUR SHEET SCRAP!

In mills, industrial plants and scrap yards, LOGEMANN SCRAP PRESSES are working day and night to prepare sheet scrap for the furnaces.

Sheet mills particularly recognize the value of the years of experience and the performance records which back up LOGEMANN designs and workmanship.

The line includes scrap presses *designed for mill service,* presses *designed for automobile plant conditions,* presses *designed for general plant applications.*

Write for details.

LOGEMANN BROTHERS COMPANY
3126 W. Burleigh St., Milwaukee, Wisconsin

The scrap press illustrated operates in one of the largest industrial plants. Compresses scrap from three directions to produce high-density mill size bundles. Built in various capacities.

Sheets, Strip

Sheet & Strip Prices, Page 130

Except on allocations and directives sheetmakers are unable to make delivery promises. On A-1-a priority it seems probable that shipments can be made in about eight weeks by most mills, while some can do nothing under ten weeks. One large producer had no available supply for July delivery except tonnage from a hand mill at one plant. A large producer who has made no sheets for several weeks because of diversion of strip-plate will continue out of sheet market in all probability for a month or two longer.

Orders in some districts have been relatively light but specifications against orders are well sustained. A larger volume of orders would be available if mills were able to handle them.

Narrow cold strip production is heavily centered in high carbon and alloys, with increasing stress on end-use, notably on the latter, with deliveries on stock for rerolling somewhat more extended and dependent on primary melting schedules. The Production Requirements Plan is contributing confusion among some consumers uncertain as to procedure, while producers of cold strip have difficulty in some instances tracing end use, mostly through subcontractors. Considerable strip continues to be offered from frozen consumer stocks, but this requires end use checking and high ratings. Shipments and bookings last month were about even with May, but heavier releases against forward contracts are expected during the balance of the year. Backlogs now consist of live volume only, all old undelivered tonnage with ratings below the A-1 series having been lopped off.

Plates

Plate Prices, Page 131

Demand for steel slabs to meet heavy demand for plates in some cases has outrun supply and on occasion slabs have been shipped from one area to another to keep production going.

This situation arises from the fact that under normal operation it is not general practice to maintain slabbing facilities sufficient to keep finishing mills at capacity. Ordinarily semifinished production meets fewer interruptions for roll changes and maintenance and during idle finishing time slab stocks are built up. Under present conditions finishing mills are at capacity and down time is at a minimum, call for slabs being continuous, allowing no time for piling reserves. This factor deters conversion of remaining sheet mills to production of plates in small sizes and lighter gages, as has been suggested in some quarters.

July plate allocations are being pared where possible, based on end-use of products, but the greater part of consumption is tied directly into shipbuilding and opportunities are few for reducing tonnage. Secondary distributors in most cases will receive less tonnage than in June, although considerable volume in June allocations to warehouses and others have not been delivered.

Tonnage slated for delivery in New England, however, will be heavier, shipments to the Bethlehem-Hingham shipyard having started. First keel at the 16-way plant was laid June 29, just 130 days after ground was broken. A formidable type of small fighting escort ship will be built.

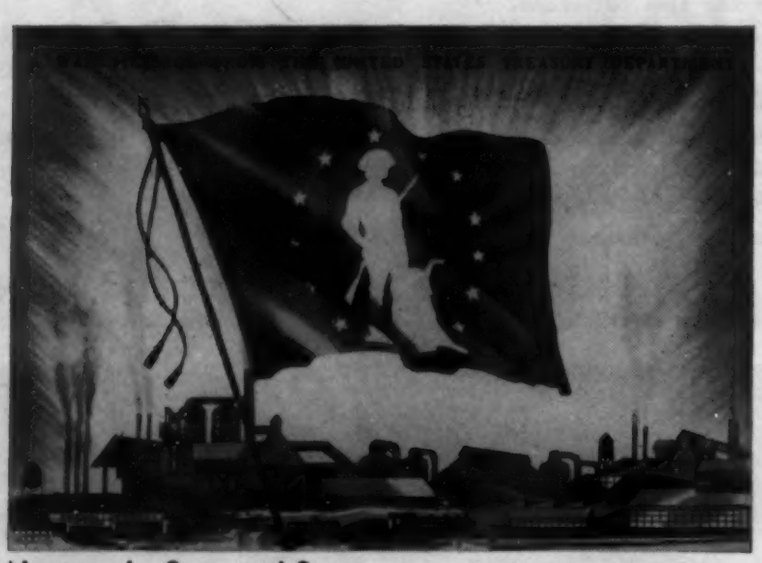
Quaker City Iron Works, Philadelphia, has booked an order for 50 mooring buoys for the War Department, requiring 625 tons of steel.

Platemakers report that applications now coming in for August tonnage show greater restraint among consumers than heretofore and there appears to be a real effort to confine requests to plates actually required for a given month. Most consumers are placing end-use symbols on orders but it will be necessary to have others do so before the orders can be forwarded to Washington, about July 12, even though this is the customer's prime responsibility.

Bars

Bar Prices, Page 130

Carbon bars on an A-1-a rating are now not available under 10 weeks and most sellers, while making no definite commitments, indicate that 12 weeks is nearer the fact. Generally speaking, this range



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of deliveries applies to cold-finished as well as hot bars. Increasing allocation of semifinished steel abroad is a factor in the present greater stringency. In alloy bars this is not a factor, it is pointed out, and consequently delivery schedules continue largely unchanged at around 25 to 30 weeks.

The new and higher scale of priorities will be applied slowly, in the opinion of trade interests. Certainly, they believe, there will be no broad sweeping change over night. It appears likely that as various consumers find current ratings not sufficient for their needs they will, as is done frequently now, apply to Washington for a directive and in this manner probably will open the way for application of the newer priorities.

Pipe

Pipe Prices, Page 131

While demand for merchant pipe has declined considerably the supply has shrunk even more sharply. Lapweld pipe is particularly scarce, with little available under eight weeks, even on A-1-a rating. Supplies of butt-weld made from bessemer steel are available at much better delivery. Some mills can ship in two to four weeks on most A-1 priorities. Some butt-weld producers are in a position to make fairly definite promises down to and including A-3. Deliveries on high rated tonnages of mechanical and boiler tubing average about 13 to 14 weeks.

Soil pipe foundries have been restricted in July allocations of pig iron and are turning more to the use of scrap, cast grades now being in better supply. On the thinner-walled pipe the government has asked them to make as a means of conserving material they find they are limited in the proportion of scrap they can use with satisfactory results.

Wire

Wire Prices, Page 131

Specifications to wire mills for alloy specialties are expected to increase during the balance of the year. Orders are on books covering an indefinite period with releases each month tending upward. While round wire capacity is fully engaged, the ratio of high carbon being high, flat wires are lagging and some finishing equipment is idle. Rods and heat-treating capacity continue to limit production on numerous finishes and suppliers of strand for rope are pushed to meet heavy demand. June shipments about equal May, with new bookings slightly under deliveries.

Rails, Cars

Track Material Prices, Page 131

Some carbuilding shops have suspended operations and others will close during third quarter as a result of production limitations and lack of steel. Only a small part of the 18,000 cars to be built in the last three quarters of the year have been completed, none by commercial car builders. Nearly 15,000 have not yet been rated, 2450 have been given priorities and only a few are under construction.

Chief reason is that the SPAB program is slowly being worked out and car shops have had on their books substantial orders which they were permitted to complete. Deliveries had been made up to June 1 of 46,313 cars on the SPAB program and 46,894 were still on order. Assigned ratings on these cars was moved from A-3 to A-1-j and then to A-1-a but this did not produce necessary steel and directives and allocations have been issued against several orders. Directives covered bars, shapes and plates but not wheels, axles and miscellaneous fabricated parts. Railroad parts makers have been able to maintain deliveries on A-1-a ratings but the situation is growing worse.

Present deliveries of wheels and axles are for repair and maintenance, most moving on directives and allocations. In some cases minor items have held up construction, in one recent case need for 40 tons of a special bar holding up completion of work on 650 cars for which all other material had been shipped.

Passenger car construction is tapering to its close Aug. 31. Some builders have been caught with ratings too low to replace spoiled material. Repair shops are bearing a heavy load. Old cars built to oper-

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Annealing . . IN THE STRONG MANNER

Users of Strong steel castings are keenly aware of how much they gain in the elimination of internal stresses by the Strong heat-treating and annealing processes. The pit annealing furnace shown above is 15 feet wide by 19 feet long—amply large to heat-treat and anneal the largest of Strong-cast castings. It is oil fired and controlled by recording pyrometer.

Wherever it is desirable, Strong double anneals its castings for extra protection. Strong also uses a car type annealing furnace, oil fired with heat recorder control. Strong can tell a host of vital facts about heat-treating every steel casting buyer should know. Just ask for them.

STRONG STEEL FOUNDRY COMPANY, BUFFALO, N. Y.

STRONG

TENSILE STRENGTH · ELONGATION

ate at slow speeds are being strengthened, fitted with larger wheels and put into fast service. This is particularly true of tank cars, where the supply is almost entirely from rebuilt cars, less than 600 new units having been delivered this year. Cars designed for milk, acids and other liquids have been revamped for carrying petroleum products.

Structural Shapes

Structural Shape Prices, Page 131

Deliveries on structural shapes are further extended, A-1-a ratings requiring ten to 14 weeks, with few definite promises being made. Mills are receiving a great increase in directives, with a heavy proportion going to ship construction. This is delaying deliveries of high-rated material and increases difficulties of fabricators in completing work now in process. This condition and revision of plans to use wood instead of steel is causing some fabricating shops to curtail operations.

New orders for fabricated structural steel booked during May totaled 192,822 net tons, according to reports to the American Institute of Steel Construction. This was about equal to average bookings during 1941. May shipments were about equal to average monthly shipments so far this year. Estimate of contracts placed during April has been revised downward about 17,000 tons, due to changes in structural plans caused by the War Production Board when further restrictions were placed on construction, to save steel. Contracts in May, at 192,822 tons, compared with 310,250 tons in April and 179,884 tons in May, 1941. May shipments were 173,321 tons, compared with 180,987 tons in April and 191,905 tons in May, 1941. Tonnage available for future fabrication at the end of May was 843,809 tons.

Reinforcing Bars

Reinforcing Bar Prices, Page 131

The highspot of last week in reinforcing steel is distribution of 37,500 tons of bars to several producers. This tonnage will be used in 24 concrete ships to be built in the South by M. H. McCloskey Co., Philadelphia. It is reported 51 additional concrete ships are to be built in other yards, requiring a total of 80,000 tons of reinforcing. The ships are for the Maritime Commission and take an A-1-a rating.

Cummins Construction Co., Baltimore, had an inquiry out for 1020 tons of bars for a government hangar in Maryland, but as its rating was A-1-e bar sellers were not interested.

Substantial curtailment in orders for reinforcing steel is experienced by most producers, although orders on books are heavy. Supply of semi-finished steel for this purpose is greatly restricted and sellers can entertain only the highest priority.

Pig Iron

Pig Iron Prices, Page 132

Pig iron allotments for July vary in the several districts, some receiving larger tonnages than in June and others being given less. Foundries on vital war work are being given larger tonnages while those whose contracts are at lower ratings have been cut down sharply. Machine tool builders are much favored as their product is regarded as most essential. In general, foundries on heavy work are given more consideration than those making light castings, some of the latter having exhausted their supply of iron. Trend of ratings continues to rise.

Better supply of cast scrap is leading Washington to request foundries to use a greater proportion of scrap, to conserve pig iron. Soil pipe makers have been restricted on pig iron allowances for this reason and find difficulty in making the thinner-walled pipe the government has asked them to make, proportion of scrap being limited to obtain satisfactory pipe.

Scrap

Scrap Prices, Page 134

Signs increase to give substance to the belief that scrap will be in short supply before the end of the year. While drives to bring out dormant material are continued the total result is barely sufficient to sustain current production and

Therm-O-flake
INSULATION BRICK

One of lightest insulation brick available—(about one pound each).
Has low thermal conductivity, and is most economical for efficient insulation.
Can be compacted without breaking and cuts easily.
Especially valuable for back up work behind fire brick walls.
Acts as expansion cushion between furnace walls and binding structure.

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much of the tonnage once cleared will not be duplicated.

More drastic methods by the government are believed necessary to bring in a potential tonnage held back by sentimental or other reasons. These include ornamental fences in cemeteries and in large estates.

Heavy shipments of semifinished steel under lease-lend are another factor in scrap shortage, the scrap resulting from further processing and fabrication being lost to domestic industry. This is said to constitute a large tonnage in the aggregate.

Salvage of tin cans will be started soon under the plan to have families flatten and prepare cans for collection without waste of space.

Unusual flood conditions in territory west and southwest of St. Louis have prevented free movement of scrap but steelmakers have maintained production by using such reserves as they had accumulated. Indications are that operations may be curtailed unless increased flow starts soon.

A slight recession in scrap shipments to the Buffalo district seems to have been stopped and the movement appears better. Industrial salvage is reported at a little over 5000 tons for first half of June, compared with 7300 tons for the entire month of May. Material from automobile wrecking yards is moving better in that area.

It is estimated unofficially that more than 100,000 tons of scrap has arrived in the Buffalo district from the upper lakes and by barge canal. The larger part of this has been by the lakes. Boat arrivals for June are estimated at about 25,000 tons.

Edward A. France Jr., OPA scrap representative, and Thomas Lyons, WPB scrap official, have returned from a two weeks trip to the West Indies and several South American countries where they investigated the scrap situation. Further negotiations will be carried on through the mails.

With cast grades in better supply than earlier in the year Washington is urging foundries to use scrap as far as possible to conserve pig iron and is limiting the latter appreciably, with due regard to the proportion of war work in hand.

Warehouse

Warehouse Prices, Page 133

Volume of business by steel and iron warehouses fell further in June but the decline was not as great as had been expected early in the month. Some large interests found business little changed from preceding months, while others experienced a drop of 10 per cent.

Maintenance of their trade has been at the expense of stocks, substantial inroads being made, with consequent narrowing of assortments. Mill replacements have fallen off much more than warehouse sales. Much larger sales could have been made had material been available or replacements possible.

Shipments against quotas have been declining all year and it is estimated that in second quarter many distributors received no more than 55 per cent of their quota tonnages, compared with about 85 per cent in first quarter and 110 per cent in the final quarter last year. A further drop is expected in third quar-

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten Types

(For each 1% tungsten contained)

Solid scrap containing over 12%	1.80
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.60
Do., 5 to 12%	1.40
Turnings, millings, solids under 5%	1.20

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 1% vanadium	13.50
Turnings, millings, same basis	11.50

Mixed Scrap

(Molybdenum and Tungsten Types)

Solid scrap, each 1% contained tungsten	1.60
Solid sorap, each 1% molybdenum	.80
Millings, turnings, each 1% tungsten	1.40
Millings, turnings, each 1% molybdenum	.70

PERFECTION AS A MATTER OF COURSE

■ The steel ball bearing is a theory put into practice. Based on the principle of *rolling contact*, it represents one of the greatest steps ever taken in the matter of overcoming friction. While STROM BALLS possess all the qualities required in first class ball bearings, the makers stress the unequalled surface smoothness and sphericity of STROM BALLS. By virtue of a unique lapping operation extreme precision is obtained—and this is done as a matter of course at the Strom Plant. Every STROM BALL is unconditionally guaranteed for physical soundness, correct hardness, size accuracy and sphericity. Also available in all standard sizes are other types of balls: STAINLESS STEEL, MONEL, BRASS and BRONZE. Catalog and prices sent on request.

Strom STEEL BALL CO.

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The largest independent and exclusive Metal Ball Manufacturer

ter in mill shipments and necessarily a decrease in sales, due to depleted assortments. Unless regulations are changed fourth quarter will see almost complete depletion of stocks, at the present rate of decrease.

Many suppliers are unable to fill completely combination inquiries, supplying some items while customers shop around for the remainder, several warehouses thus contributing to the same order.

Canada

Toronto, Ont.—Continued increase of shipments against war priorities has practically shut out deliveries of steel to consumers not engaged at almost full time on war contracts. This has resulted in sharp curtailment in production by numerous small companies whose plants are not adaptable to war work and it is stated that total suspension of operations now face these concerns. For several weeks past there has been a definite change in steel production, mills chiefly centralizing on materials most urgently needed for war.

A definite example is the general slowing down in operations of wire mills through shortage of steel, resulting in scarcity of all materials under this head. Nails have been hard hit and only small quantities of nails are available. Some buyers have been forced to go outside the province to obtain even small quantities for urgent need. This shortage affects the war industry as well as others. Most mills now are centralizing the bulk of their production facilities on plates and sheets to meet increasing demands from shipbuilders and tankmakers and also to supply plate for war vehicles and urgently needed rolling stock. The increased output of plate and sheets necessarily has been reflected in slowing down in other departments, due to insufficient raw materials. In addition to more careful supervision of steel shipments, most orders now must be approved by the steel controller and before an order is accepted the end use must be definitely stated. Canada is following many regulations in effect in the United States, and Canadian purchasers are having trouble keeping pace with rapidly changing regulations.

Structural steel fabricators also have been under the necessity of making drastic revisions in operating and production programs. While large orders for shapes and other structural materials continue to come out, all against war contracts, fabricators recently have been swinging over to shapes for ship construction and most plants now are engaged in this type of work. Structural lettings for war plant construction was about 10,000 tons last week, while other undertakings that were announced in the past month, for which steel has not yet been contracted, involve about 40,000 tons.

Orders for tools and other lines of equipment have started to slow down, but producers show no indication of curtailed operations due to backlogs that will keep plants at maximum operations for months.

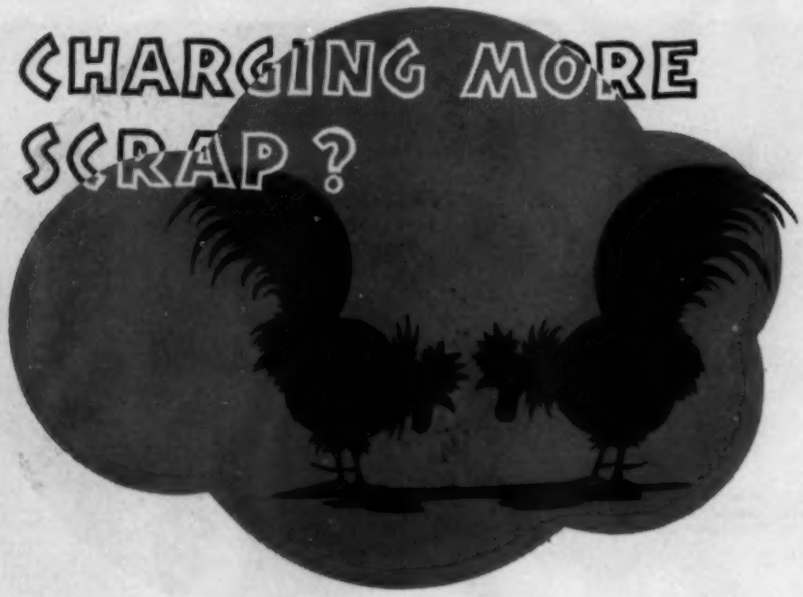
Merchant pig iron sales fell slightly during the week to approximately 8000 tons. Improvement in the scrap situation has been reflected in reduced demand for pig iron as foundries again have sufficient scrap. Pig iron stocks have increased to about 40,000 tons, which gives producers some leeway on filling current orders.

Iron and steel scrap offerings continue heavy, with no falling off in demand. Consumers are making special efforts to build reserves and are meeting with some success. Further slowing down in offerings from automobile wreckers was reported but against this curtailment larger shipments were reported from the rural districts and producing plants.

Steel in Europe

Foreign Steel Prices, Page 133

London—(*By Cable*)—War industries of Great Britain are assured steel and iron supplies for third quarter despite increased demands on steelmakers. Allotments to commercial users have been cut drastically. There is brisk call for rerolled products, including light structural sections, bars and black sheets. Pig iron output is ample for all needs. There has been no improvement in tin plate.



If you are charging more scrap in your open hearths to conserve pig iron, use dependable No. 34-30 Mexican Graphite to secure the necessary carbon . . . charged under the lime in basic practice it contains no sulphur, works quietly into the metal giving high carbon recovery . . . stops lime build-up and sticky heats . . . avoids foaming reactions, hot roofs, clogged checkers, long heat time and soft heats . . . Complete particulars mailed you upon request.

THE UNITED STATES GRAPHITE CO.
SAGINAW MICH.
NO. 34-30 MEXICAN GRAPHITE

Nonferrous Metal Prices

June	Copper Electro, del. Conn.	Copper Lake, del. Midwest	Copper Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
1-30	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.50	35.00
July 1-2	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.50	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.75
Zinc, l.c.l.	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

Magnesium

(12 pound rod, 4 in. diam.)

99.8% ingot, carlots	22.50
100 lb. to carlots	24.50
Extruded sticks, ¼ to 2 lb.	
Carlots	32.00
100 lb. to carlots	34.00

OLD METALS

Dealers' Buying Prices
(In cents per pound, carlots)

Copper

No. 1 heavy	9.25-10.00
Light	7.25- 8.00

Brass

No. 1 composition	8.75- 9.50
Yellow brass castings	6.25- 7.25
Auto radiators	6.75- 7.25
Red Brass, borings & turnings	8.50- 9.25

Zinc

Old	5.00- 5.75
New clippings	6.50- 7.25

Aluminum

Clippings	10.00-11.00
Cast	8.75-10.00
Pistons	8.75-10.00
Sheet	9.00-10.50

Lead

Heavy	5.00- 5.50
Mixed babbitt	4.50- 6.75
Electrotype shells	5.00- 6.25
Stereotype, Linotype	6.25- 7.50

Tin and Alloys

Block tin pipe	44.00-46.00
No. 1 pewter	32.00-38.00
Solder joints	7.75-10.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l.	13.25
Standard No. 12 aluminum	14.50

Nonferrous Metals

New York—Brass mills, wire mills and foundries have been informed that Form PD-175 Revised has been suspended because Priorities Regulation No. 10 requires similar information on all orders for copper and copper base alloys as well as other metals and materials. The forms to be used by these parties in applying for copper allocation are PD-59, PD-59C, PD-59D, PD-123A and PD-123B.

Regardless of the application of the new Allocation Classification System symbols, buyers of aluminum must continue to furnish the information which hitherto accompanied monthly requests for aluminum deliveries.

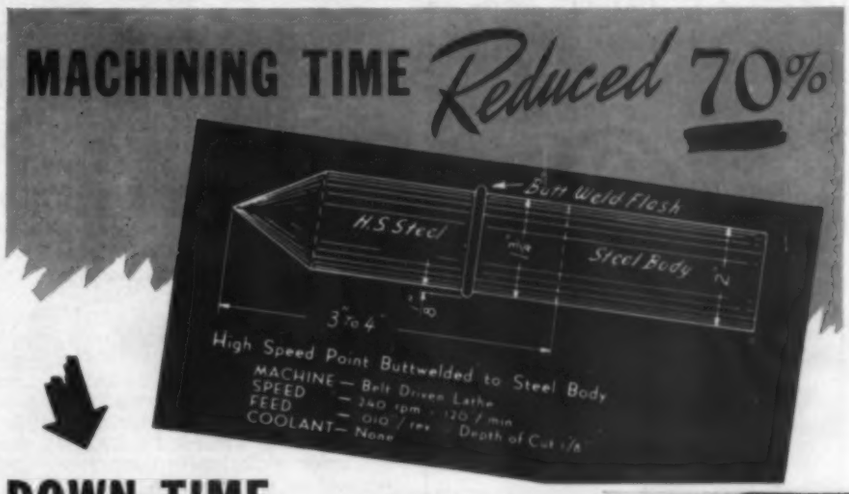
An official interpretation, No. 1, of Priorities Regulation No. 11 has been issued, pointing out that smelters and refiners of metal which use more than $5000 worth of metal in a quarter for maintenance, repair, operating supplies and for processing into forms not listed in the Metals List of Regulation No. 11 are required to apply for priority assistance under PRP.

Copper—Scrap intake by custom smelters has eased to 1093 tons but is expected to increase in view of the gain in commitments.

Lead—Refined lead stocks are the largest since the middle of 1939, but restrictions on use will be continued. Reserves must be large since imports of foreign metal may be curtailed some time in the future.

Zinc—Consumers who operate under the PRP must continue to file their usual PD forms by which they have received allocations of material directly from the WPB Zinc Branch.

Tin—Manufacture or use of tin plate or terne plate cans for many chemicals, paints, and other "special products" has been banned by WPB.



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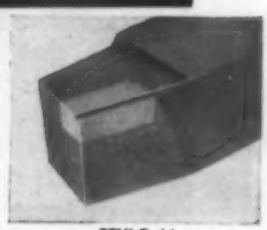
with KENNAMETAL* tools



STYLE 11

In machining the butt weld flashing of high speed steel cylinder illustrated above, KENNAMETAL tools turned 30 pieces per grind as compared to 6 pieces per grind obtained with high speed steel tools. In addition, KENNAMETAL was used at 120'/min. while maximum speed with high speed steel tools was 80'/min. KENNAMETAL also did the work in one cut, while two cuts were required with high speed steel. In short, KENNAMETAL reduced machining time 70 per cent.

If you are working on war orders, machining steels hardened up to 550 Brinell, KENNAMETAL can help you get out more work per shift. KENNAMETAL tools cut at speeds 2 to 6 times faster than are possible with high speed steels, removing 3 to 10 times as much metal between regrinds. Write for the KENNAMETAL Vest Pocket Manual, showing how to get the most from your KENNAMETAL Tools in production.

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Exclusive of Canada and Great Britain

Keagler-Nukem

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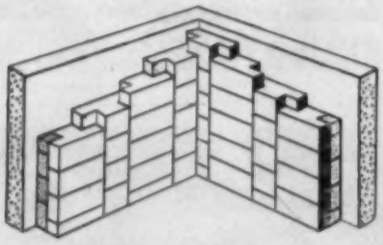

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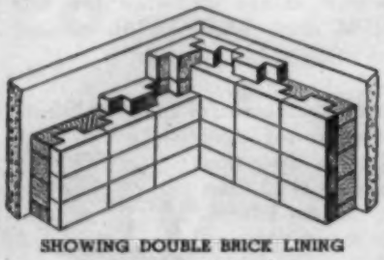
(PATENT APPLIED FOR)

Here is a new brick shape, manufactured of fire clay by the deairated method, and highly resistant to acid. It guarantees maximum strength of acid proof wall, and is particularly adapted for high temperature pickling tank construction. The bricks are so shaped that walls may be made 5" or 8" without using additional brick. The type shown above is especially adapted as a sheathing for steel rubber-lined tanks, concrete shell tanks, acid pits or wooden tanks. Samples and catalogs sent on request.



SHOWING DOUBLE BRICK LINING
(PATENT APPLIED FOR)

KEAGLER BRICK CO.

★

STEUBENVILLE, OHIO

Pacific Coast

Seattle — O.P.A.'s new price regulations covering reinforcing steel items have not been clarified and considerable confusion prevails in this market, especially as the rules are retroactive to June 15. Meanwhile Washington has been asked to explain what is expected. The new regulations are regarded as a general reduction from the previous price ceiling.

Government orders are using the capacity of rolling mills, fabricating plants and machine shops. Backlogs in most cases will run to the end of 1942. New orders are being added to previous commitments as army, navy and shipyards require additional materials.

Kaiser Co. Inc. has awarded a contract to Wegman & Sons, Portland, for construction of a 460 x 151-foot deck erection loft-type building and to Ralph & Horowitz, Portland, for a machinery storage structure, 372 x 76 feet. Both buildings are steel frame for which Bethlehem Steel Co., San Francisco, will furnish 4000 tons of shapes.

According to Congressman C. H. Leavy four additional units will be built in addition to the original two now under construction at the Spokane aluminum plant.

Washington, Oregon and Idaho are postponing all highway work which is not of immediate necessity. Wherever possible, wooden bridges are being built. Contractors show little interest in state road jobs. Montana has awarded a $368,716 contract for a 34.8-mile road from Columbus to the Benbow chromite development project. Reclamation Bureau has canceled a $374,000 contract with Kern & Kibbe, Portland, for construction of two tunnels in Oregon, awarded in February, as contractors are unable to obtain the steel items required.

Kuney Johnson Co., Spokane, is low to Port of Seattle for construction of 36 concrete grain bins, bidding $236,313, addition to the Hanford street elevator. For this job 300 tons of reinforcing is available. Western Pipe & Steel Co., San Francisco, low at $70,384, has the contract to fabricate penstocks, gates, etc. for Tacoma's Nisqually power project, involving about 500 tons of plates.

Henrik Vallee Co., Seattle, is low to United States engineer for erecting a warehouse, details not announced. United States engineer, Portland, has received bids for base engineering shop and bomb sight storage building at an unstated base.

District 61, Seattle, has awarded 500 tons 4 to 8-inch cast iron water pipe to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Marckmann & Williams, Seattle, has the contract for 1500 tons 6 to 12-inch cast iron pipe for a military base in Montana.

Weyerhaeuser Timber Co. is building a two-story research laboratory at Longview, Wash. to develop new uses for forest products in plastic and other lines. Seven laboratories and several pilot plants will be installed.

San Francisco—Awards of struc-

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Managing Director

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CHICAGO

tural shapes during the past week led all other markets and 12,370 tons were booked. Backlogs in Pacific Coast fabricating shops are still heavy, though practically no new inquiries are developing for plant extensions. Open-hearth extensions at the Seattle plant of Bethlehem Steel Co. are awaiting receipt of priorities.

Several fair sized plate awards were reported totaling 8705 tons. A number of pipe line projects involving either welded steel, cast iron, cement asbestos or reinforced concrete pipe have been received on the welded steel pipe basis.

Cast iron pipe mill representatives report numerous orders involving good sized tonnage coming in for defense public works projects. Those in close touch with the situation, state that the total tonnage placed so far this year far exceeds the tonnage for corresponding periods in prior years. Little information is being released in regard to the tonnages being purchased by the government for installation at many points in the far western territory.

Iron Ore

Iron Ore Prices, Page 133

Iron ore movement on the Great Lakes in June totaled 12,625,102 gross tons, slightly lower than the all-time record of 12,677,356 tons moved in May, but 17 per cent larger than the tonnage shipped in June, 1941. Drop in the June movement was due to the shorter month and some delay from fog. Daily average loading in June was 420,834 tons, compared with 408,947 tons in May.

Comparison of shipments for June this and last year are as follows:

	June, 1942	June, 1941
Escanaba	836,190	684,324
Marquette	604,728	657,197
Ashland	961,220	884,265
Superior	4,675,885	3,862,989
Duluth	3,008,149	2,730,219
Two Harbors	2,470,887	1,912,143
Total U. S.	12,557,059	10,731,137
Michipicoten	68,043	58,792
Grand total	12,625,102	10,789,929

Cumulative statistics to July 1 are as follows:

	To July 1, 1942	To July 1, 1941
Escanaba	2,589,939	1,805,081
Marquette	2,067,734	2,281,611
Ashland	2,695,945	2,737,287
Superior	12,098,315	9,885,874
Duluth	8,038,337	7,095,024
Two Harbors	6,271,445	4,852,024
Total U. S.	33,761,715	28,656,901
Michipicoten	190,451	168,431
Grand Total	33,952,166	28,825,332

While there is little to test the market, prices on foreign manganese ore are nominally higher, due to increases in shipping costs, principally in war risk insurance. These rates vary considerably, especially as they are quoted by the government and private agencies. Where the government underwrites the war risk insurance on shipments from South America, for instance, the rate is 6 per cent; where

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private agencies are called upon to do the underwriting, the rates range up to 15 per cent.

Practically no 48 per cent manganese ore is now moving out of Brazil or being offered, but on 46 per cent the nominal market, eastern seaboard, before duty, appears to range anywhere from 78 to 84 cents, or perhaps a shade less where the government is the direct purchaser and can provide its own transportation facilities.

South African manganese, 48 per cent, appears around 80 to 86 cents, although less can probably be done on direct purchases through the government. Meanwhile, Cuban manganese, 51 per cent, is holding purely nominal at 85 cents, duty free; domestic manganese, 48 per cent, $1, f.o.b. mines.

Brazilian chrome ore prices are nominally easier, with 44 per cent, 2.5:1 lump now holding at $28.50, c.i.f. Baltimore, excluding war risk insurance, and 48 per cent, 3.1, $38.

Cancel Much Steel Under New Preference System

As a large number of tin plate consumers fabricate products which are banned, substantial cancellations have resulted. Some consumers, engaged entirely in manufacturing these products, have been forced to cancel all tonnage on order for third quarter and plan to close their plants.

Cancellations also are reported on a variety of products in connection with application of PRP, some large consuming companies which have received ratings under this plan wiping out all previous orders as a matter of simplification.

While there is still much confusion concerning application of the new ratings the general opinion is that all ratings under AA, which automatically takes AA-2 under the new preference system, will be changed as occasion warrants, as far as old orders are concerned. New orders of great urgency will draw on the new ratings.

Colorado Fuel & Iron Granted Price Relief

Colorado Fuel & Iron Corp., Denver, has been granted permission to pass on to the buyer a larger share of heavy freight costs on shipments of iron and steel products to the Eastern seaboard for the account of the lend-lease administration.

Such shipments, OPA explained, go far beyond this company's usual market area.

Company is permitted on sales for lend-lease account to charge maximum Chicago basing point prices, f.o.b., Minnequa, Colo.

Similar relief on all Lend-Lease shipments to the Eastern seaboard has been granted to Sheffield Steel Corp., Kansas City.

Plant Expansion, Construction and Enterprise, Government Inquiries, Sub-Contract Opportunities, Contracts Placed and Pending

SUB-CONTRACT OPPORTUNITIES . . .

Data on subcontract work are issued by local offices of the Contract Distribution Branch, WPB. Contact either the office issuing the data or your nearest district office. Data on prime contracts also are issued by Contract Distribution offices, which usually have drawings and specifications, but bids should be submitted directly to contracting officers as indicated.

Philadelphia office, Contract Distribution Branch, Production Division, WPB, Broad Street Station building, reports the following subcontract opportunities:

Keefer-28-1: Connecticut concern is seeking subcontracting facilities on fuze body, 2⅝-inch long, 1.378-inch diameter, one external and two internal threading operations. Material, steel, WDX 1314 cold-drawn. Die head with chasers and three tap heads with chasers and cadmium plate and material furnished by prime contractor. Tolerances plus or minus .003. Quantity, 350,000 pieces at rate of 50,000 per month, to start by July 20. Equipment, four-spindle automatic screw machines, J & L turret lathes or equal, New Britain chucking machine or equal. Prints and specifications at Philadelphia office.

Roystuart-22-1: Government is lining up facilities to produce large variety of torpedo mechanism components, including many special types of screws, cap screws, bolts and studs, special pins, hollow shafts, etc. Material, brass, steel and stainless steel. All forgings to be furnished by prime contractor. Most finished to close tolerance. Large quantity needed and production is to start as soon as possible. Contract by negotiation. Equipment, turret lathes, screw machines, milling, drilling, precision grinding of various sizes, heat treating and testing equipment. Prints, specifications and information at Philadelphia office.

Roystuart-31-2: Government requires subcontracting facilities on aircraft components, internal tie rod assemblies of various sizes and lengths, all fitted with clevis and lock nuts at each end. Made from corrosion-resistant steel. Tolerances medium. Quantity, 4345, production to start soon. Contract by negotiation. Prints, specifications at Philadelphia office.

Roystuart-31-6: Government desires subcontracting facilities for manufacture of electric fuse mounts for cartridge-type fuses, open clip type, 113,000 pieces; transparent shield type, 50,000 pieces. Production to start soon. Contract by negotiation. Prints, specifications at Philadelphia office.

Roystuart-32-1: Government requires facilities for machining cast steel marine propellers. Equipment needed for shaping, drilling, boring, profiling, polishing, balancing. Overall diameter, 19 inches. Tolerances, close. Quantity, 3000 each, right and left hand. Production to start as soon as possible. Contract by negotiation. Prints, specifications at Philadelphia office.

Van Valkenburgh-26-1: Pennsylvania firm requires subcontracting facilities for cylinder frames. Requires planers with 18 to 20-foot stroke and No. 4 heavy millers. Materials to be furnished by prime contractor.

Van Valkenburgh-26-3: Pennsylvania company seeks subcontracting facilities for heavy casting work, requiring vertical boring mills with 13½ to 14-foot swing. Fairly close tolerances. Requirement also calls for repair and annealing before shipment. First castings will be ready about July 15. Material to be furnished by prime contractor.

Van Valkenburgh-37-1: Pennsylvania concern is seeking subcontracting facilities for machining of high, low and intermediate cylinders of triple expansion engines in diameters of 24½, 37½ and 70-inch bore. Necessary tools are vertical boring mills, ranging from 8 feet and over, with 10-inch head clearance, horizontal boring mills with 4 to 6-inch bars and 4 x 12-foot planers.

Keefer-36-1: Massachusetts company requires subcontracting facilities for the following: (1) collar pin stud, 1¼-inch overall length, diameter .187-inch threaded on one end, length of thread 7/32-inch, length of pin end .531-inch to collar, width of collar .093-inch and chamfered, diameter of collar 15/32-inch; drilling on pin end .187-inch diameter, ⅛-inch deep; to be cadmium plated; tolerances plus or minus .003. (2) Cylindrical body ½-inch overall length, diameter .218-inch; drilling and countersink on one end to depth of .187-inch, diameter of drilling .156-inch; opposite end a drilling, countersink and counterbore operation, combined depth of drill and counterbore .234-inch, diameter of drilling .093-inch, diameter of counterbore .156-inch; to be knurled for a distance of ⅛-inch starting 1/32-inch from end of body; tolerances plus or minus .002. Materials, for collar pin stud, brass, 1.5 per cent lead, and for cylindrical body, aluminum, 99.8 hard. Automatic screw machine, ¼ and ½-inch capacity required. Quantities, stud, 25,000 to 50,000, and body, 100,000 to 200,000. Prints at Philadelphia office.

Chase-22-3: Connecticut concern seeks subcontracting facilities for aviation motor components. Diffuser support studs, breather connection bodies, valve tappet rollers, main crank case studs, pusher rods ball ends, valve rocker shafts, exhaust valve spring washers and supercharge drain adapters. Material largely bar stock steel. Tolerances, medium and close precision. Quantity, various, production to start as soon as possible. Equipment, screw machines or equivalent, light milling machines, drilling and light forging equipment, all of various sizes; also heat treating equipment. Contract by negotiation. Prints, specifications and information at Philadelphia office.

Chase-22-4: New York manufacturer seeks subcontracting facilities for magneto parts, breaker cams, distributor gear shafts, cam drive gears and other parts. Material, bar stock, various sizes. Tolerances, high precision. Quantity, indefinite. Production to start as soon as possible at rate of 1000 per month. Equipment, turret lathes, screw machines, milling machines and facilities for precision grinding, heat treating and hardness testing. Contract by negotiation. Prints, specifications and information at Philadelphia office.

Chase-32-1: Maryland firm seeks subcontracting facilities for propeller hubs, forged and machined. Approximate overall size 8 x 6 x 14½ inches. Material, forging, specification BH 101 SAEX 4340 steel. Quantity, 30 to 100 per month. Equipment, lathe, drill press, broaching, threading and tapping, boring 3.5 inch. Dies and tools to be figured separately. Prints and specifications at Philadelphia office.

Cleveland office, Division of Contract Distribution, WPB, Union Commerce building, is seeking contractors for the following:

10-S-1: Subcontractor having hand screw machines, to furnish two parts. Operations: first form, finish form, thread, drill and ream. Material, CR steel. Minimum tolerance .001. Quantity, 5000 to 10,000 pieces of each part. Blueprints on file.

D-56 and D-61: Subcontractor with multiple spindle automatic to furnish fuze part. Minimum tolerance .001. Material, 2⅞-inch diameter WDX 1314 steel bar. Quantity up to 50,000 per week. Sample at Cleveland office.

D-58: Subcontractor with available facilities, consisting of automatic screw machines from B & S No. 000 to 1⅝-inch bar to fabricate quantity of small parts, 400 different items, of which representative samples are on exhibit at Cleveland office. Will negotiate.

D-63: Subcontractor with multiple spindle automatics and/or turret lathes for bar stock to furnish two fuze can parts. Hand mill and small drill press also required. Minimum tolerance, .002. Materials: 3.328-inch OD SAE 52,100 steel tubing and 2⅛-inch diameter CR steel bar. Quantity, up to 500 daily of each part. Samples on display at Cleveland office.

4-S-3: Contractor with thread grinding equipment, J & L, Ex-Cell-O type, or equivalent, to grind threads on four items ¼-20 P.D.; also .494 P.D. 32 thread; and .498 P.D., 48 thread. Material, stainless steel. Delivery, 100 June, 300 July, 400 August, 600 September, 800 October, 1000 November. Further information from Dayton, O., office.

4-S-4: Subcontractor for automatic screw machine work on two parts. Six-spindle or four-spindle automatics of ⅝-inch diameter bar capacity re-

quired. Minimum tolerance .005-inch. Material, SAE 1335 steel. Quantity, up to 100,000 and 25,000 pieces per month respectively. Blueprints on file.

7-S-9: Forging facilities to furnish 3000 to 36,000 connecting rods of four sizes. Largest rod 16 inches long, 5½ x 2½-inches crank end; smallest rod 9 inches long, 3½ x 1½-inches crank end. Also 11 sizes of caps 6½ x 3⅞-inch to 3⅞ x 1½-inch overall. Also subcontractor to machine rods and caps complete, including milling, rifle drilling, boring, babbiting and tinning. Material, SAE 3140 and 4140. To be heat treated after forging. Tolerances, .001 on bore, commercial on all others. Delivery to be negotiated. Blueprints on file at Canton, O., office.

8-S-3: Subcontractor to perform all milling and planing operations cylinder block and bases, requiring heavy-duty No. 4 milling machine and approximately 160-inch planers. Delivery, 8 to 10 sets per month. Samples at prime contractor's plant. Material to be furnished. Prints at Cleveland and Pittsburgh offices.

8-S-8: Forging and machining facilities to furnish complete 8-throw crankshafts 152⅛ inches in length, weighing approximately 8620 pounds. Steel blanks to be furnished by prime contractor. Equipment indicated: Forging, heat treating, boring, turning, five-foot radial drill, 60-inch lathe, planer. Delivery, two per week, starting Oct. 1. Tolerances plus or minus .010 on turned diameters. Blueprints at Cleveland and Pittsburgh offices.

D-45: Subcontractor with machine tools consisting of automatics or hand screw machines, to ¾-inch; Blanchard grinders, broaching machines, lapping No. 3 Warner & Swasey machine, Heald boremattics, hand mills. Material, steel bar stock. Tolerances, close. Blueprints and samples at Cleveland office.

D-58: Subcontractor with available facilities consisting of automatic screw machines from B & S No. 000 to 1⅝-inch to fabricate quantity of small parts; 400 different items, of which representative samples are on exhibit at Cleveland office. Will negotiate. Blueprints at Cleveland office.

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STRUCTURAL SHAPES

SHAPE CONTRACTS PLACED

4000 tons, shipyard, Kaiser Co. Inc., to Bethlehem Steel Co., San Francisco.

3505 tons, 21 additional salvage tugs, United States Maritime Commission, to Basalt Rock Co., Napa, Calif.

2700 tons, drydock frames, California, to Judson-Pacific Co., San Francisco.

1900 tons, addition to du Pont ordnance works in Indiana, to Bethlehem Steel Co., Bethlehem, Pa.

400 tons, supporting structures, specification 1632-D, Odair, Wash., to Lehigh Structural Steel Co., Allentown, Pa.

195 tons, buildings in Pennsylvania, through Day & Zimmerman, Philadelphia, to Bethlehem Contracting Co., Bethlehem, Pa.

SHAPES CONTRACTS PENDING

300 tons, Maryland state bridge, Hartford county, bids asked June 30; with A-1-j rating it is doubtful if work will go ahead at present.

250 tons, warehouse, Hingham, Mass.; bids in.

REINFORCING BARS

REINFORCING STEEL AWARDS

37,500 tons, reinforcing for 24 concrete ships to be built by M. H. McCloskey, Philadelphia, to several unstated mills.

650 tons, Twin City ordnance plant, Minnesota, to Truscon Steel Co., Youngstown, O.

135 tons, water works, ammunition dump, South Dakota, to Truscon Steel Co., Youngstown, O.

REINFORCING STEEL PENDING

1250 tons, Bureau of Reclamation, Invitation D-38,212-A-1, Odair, Wash.; bids opened.

444 tons, Bureau of Reclamation, Invitation 22,548-A-1, Mountain Home, Ida-

SHAPE AWARDS COMPARED

	Tons
Week ended July 4	12,700
Week ended June 27	17,720
Week ended June 20	19,625
This week, 1941	21,195
Weekly average, 1942	26,355
Weekly average, 1941	27,284
Weekly average, June, 1942	15,474
Total to date, 1941	814,758
Total to date, 1942	685,248

Includes awards of 100 tons or more.

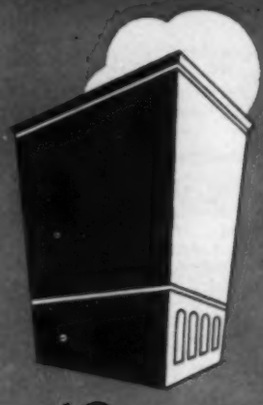
CONCRETE BARS COMPARED

	Tons
Week ended July 4	38,285
Week ended June 27	1,786
Week ended June 20	1,700
This week, 1941	5,437
Weekly average, 1942	10,309
Weekly average, 1941	13,609
Weekly average, June, 1942	5,460
Total to date, 1941	303,811
Total to date, 1942	268,057

Includes awards of 100 tons or more.

ho; bids opened.

300 tons, 36 concrete grain bins, addition to Hanford street grain elevator, Port of Seattle; Kuney Johnson Co., Spokane, Wash., low at $236,313.



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CHARLES H. LOTT
General Manager

PLATES . . .

PLATE CONTRACTS PLACED

5200 tons, 36 to 48-inch welded steel pipe, defense public works, Southern California, to Western Pipe & Steel Co., Los Angeles.

3005 tons, 21 additional salvage tugs, United States Maritime Commission, to Basalt Rock Co., Napa, Calif.

625 tons, 50 mooring buoys, war department, to Quaker City Iron Works, Philadelphia.

500 tons or more, penstocks, gates, etc., Nisqually power project for Tacoma, Wash., to Western Pipe & Steel Co., San Francisco.

500 tons, outlet pipes and penstocks, Alder and La Grande dams, Oreg., to Western Pipe & Steel Co., San Francisco.

PIPE . . .

CAST PIPE PLACED

1500 tons, 6 to 12-inch, military project near Great Falls, Mont., to Marckmann & Williams, Seattle, for Central Foundry Co., New York.

500 tons, 4 to 8-in., District No. 61, Seattle, Wash., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

CAST PIPE PENDING

639 tons, water and gas system, airport, Southern California, 6 to 12-inch cast iron, or cement asbestos pipe; bids opened.

490 tons, water system, airport, Central California, 6 to 12-inch cast iron, cement asbestos or wood stave pipe; bids opened.

282 tons, 2 to 10-inch cast iron or cement asbestos pipe, temporary buildings, gunnery school, Nevada; bids opened.

100 tons, 4 to 8-inch, Poulsbo, Wash.; Valley Construction Co., Seattle, low.

CONSTRUCTION and ENTERPRISE

Michigan

DETROIT—Detroit Magnesium & Aluminum Casting Co., 540 Buhl building, has been incorporated with $50,000 capital to deal in castings by Lawrence E. Gregory, 6304 Epworth boulevard.

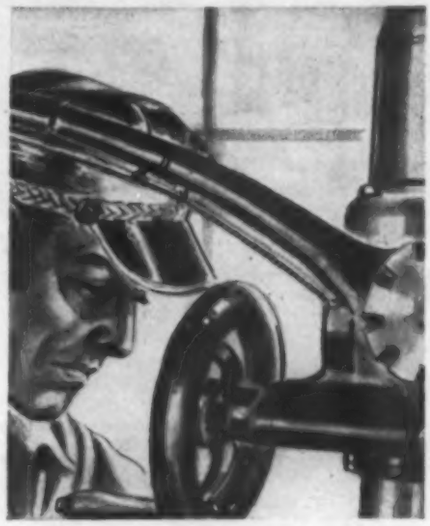
DETROIT—Weber Machine Tool Co., 2843 East Grand boulevard, has been organized to operate machine shop and engage in toolmaking, by John A. Weber, 6262 West Outer drive.

DETROIT—H. E. Beyster Corp., Detroit architect, is preparing revised plans for addition to plant of Cross Gear & Machine Co., Detroit. Plans to erect plant at Fraser have been abandoned. (Noted May 25).

DETROIT—Packard Motor Car Co. has let general contract for 200 x 300-foot plant addition to Barton-Malow Co., Detroit. (Noted June 15).

DETROIT—Campbell Construction Co., Detroit, has contract for addition to factory on Scotten avenue for Buhl Land Co.

DETROIT—Experimental Tool & Die Co.



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International Water Supply, Ltd...London, Ont.

WORLD'S LARGEST WATER DEVELOPERS

has awarded contract to Industrial Construction Co., Detroit, for $25,000 tool shop.

DETROIT—Starr Heat Treating Co., 17130 Schaefer road, has been incorporated with $50,000 capital to engage in heat treating and general manufacturing by Rowland H. Starr, Birmingham, Mich.

DETROIT—Detro't Oven & Metal Fabricators Inc. has been incorporated to engage in general manufacturing by Russell E. Brozo, 19153 John R street.

DETROIT—Servo Engineering & Mfg. Co., 6841 Michigan avenue, has been incorporated to deal in tools and machines, by Herman B. Wilson, 3429 Berkshire.

GRAND HAVEN, MICH.—Construction has been started here on plant addition for Ottawa Steel Products Inc. John Kieft is contractor.

GRAND RAPIDS, MICH. — Blackmer Pump Co. has been granted permit for addition to factory.

HASTINGS, MICH.—Castle Corp. of Michigan, has been organized with $250,000 capital to engage in general manufacturing, by Hastings Mfg. Co., Hastings.

HAZEL PARK, MICH.—Lincoln Steel Hardening Inc., 21235 John R street, has been organized with $50,000 capital to manufacture tools and process metals, by Lincoln Woodworth, 6512 Willow Grove road, Rochester, Mich.

HILLSDALE, MICH.—H. R. Graf, Jackson, Mich., is preparing revised plans for manufacturing plant here for Paramount Mfg. Co.

JACKSON, MICH.—Potts Machine Co. has let contract for addition and alterations to plant to North-Moller Co., Jackson.

JACKSON, MICH. — North-Moller Co., Jackson, has general contract for addition to plant of Ampco Twist Drill Co., Jackson. Russell Allen, Jackson, architect. (Noted June 1).

JACKSON, MICH. — Charles Braun & Sons, Jackson, will erect factory here for Goodyear Tire & Rubber Co. of Michigan.

JACKSON, MICH.—National Machine & Tool Co., Jackson, has been incorporated with $10,000 capital to deal in metal, by J. H. Loerman, 626 East Mechanic street, Jackson.

MONROE, MICH.—A tentative site has been selected near here for factory for Republic Aircraft Products Division of Aviation Corp. of America. H. E. Beyster Corp., Detroit, architect.

MUSKEGON, MICH.—Russell Engineering Co., Detroit, is completing plans for aircraft engine plant here for Continental Aviation & Engineering Corp.

Massachusetts

PITTSFIELD, MASS.—General Electric Co. has awarded contract for four-story steel factory addition and alterations to Lindholm Construction Co., 1277 East street. Estimated cost over $40,000.

Rhode Island

WOONSOCKET, R. I.—Woonsocket Rayon Co. will soon let contract for 40 x 50-foot boiler plant costing about $40,000. Jenks & Ballou, 2600 Industrial Trust building, Providence, R. I., engineers.

New York

NEW YORK—Electro Metallurgical Co., 30 East Forty-second street, plans erection of plant in Ohio costing approximately $2,500,000.

New Jersey

MORRISTOWN, N. J.—Allied Chemical & Die Corp., 61 Broadway, New York, plans erection of laboratory here, estimated to cost over $40,000.

Ohio

CINCINNATI—Crosley Corp. has applied for permit to build $130,000 one-story addition to its plant on Arlington street near Colerain avenue, to be used for offices and light manufacturing operations. Ferro Concrete Construction Co. is contractor.

CLEVELAND—Ohio Tool Co., Lester Butzman, president, will enlarge capacity for small arms ammunition production with branch plant to be established at 1981 West Ninety-sixth street.

LORAIN, O.—American Crucible Products Co., George L. Smith, secretary-treasurer, is starting $35,000 improvement program at plant, including purchase of machinery.

Pennsylvania

BLAIRSVILLE, PA. — Porter-Blairsville Co., Forty-ninth and Harrison avenue, Pittsburgh, is taking bids for alterations to factory buildings here. Approximate cost $60,000.

BRIDGEVILLE, Pa.—Vanadium Corp. of America, has awarded contract to Rust Engineering Co., Clark building.

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Lump — Ground

BRANCH OFFICES

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Pittsburgh, for plant here estimated to cost $1,000,000.

ELLWOOD CITY, PA.—Aetna Standard Engineering Co., C. H. Ohlson, Home Savings & Loan building, Youngstown, O., has let contract for one-story 60 x 150-foot factory addition here to Warren Engineering Co., 402 Atlantic street, Warren, O. Estimated cost $40,000.

GREENVILLE, PA.—Greenville Municipal Authority, C. P. Masters in charge, care of Greenville Water Co., will take bids soon for waterworks improvements costing $60,000. Morris Knowles Inc., 1312 Park building, Pittsburgh, engineer.

KANE, PA.—Speer Carbon Co., St. Marys, Pa., will spend over $40,000 for altering, improving and constructing addition to plant.

LATROBE, PA. — Stupakoff Ceramic & Mfg. Co. has let contract for one-story, 105 x 261-foot plant to Westmoreland Construction Co., 622 West Pittsburgh street, Greensburg, Pa. (Noted June 1).

MILLVALE, PA.—E. T. Lippert Saw Co., 608 Lincoln avenue, is preparing preliminary plans for factory building.

PHILADELPHIA—Bradlee & Co., 1615 North Delaware avenue, is altering foundry.

PHILADELPHIA — Fairmount Foundry, Third and Westmoreland streets, has plans by E. Schoefpe, 1602 Spruce street, for foundry.

PHILADELPHIA—I.T.E. Circuit Breaker Co., Hamilton street, has asked bids for altering and constructing eight-story plant addition. J. Fletcher Spreel, 1120 Locust street, architect.

PITTSBURGH — American Radiator & Standard Sanitary Corp., G. M. Maier, assistant vice president in charge, Bessemer building, has asked bids for manufacturing plant to cost $60,000.

PITTSBURGH—Acme Stamping & Mfg. Co., C. A. Kays, president, 201 Corliss street, has asked bids for two-story factory and office addition costing about $40,000. Braziell & Farrell, 310 Mayer building, architects.

WASHINGTON, PA.—Jessop Steel Co., R. J. Murray, secretary, in charge, has let contract for one-story 135 x 160-foot plant. Cost estimated at $50,000.

Illinois

CHICAGO—Simpson Electric Co., 5208 West Kinzie street, is erecting three-story building under Defense Plant Corp. financing. Ready for occupancy in about 60 days, this additional space will approximately double the company's manufacturing facilities.

CHICAGO—Conveyor Systems Inc., 325 South California avenue, is adding another unit to its plant, to provide increased manufacturing space.

CHICAGO—Magnaflux Corp., 5908 North Northwest highway, is constructing additional laboratory and engineering space adjacent to its present factory for research in magnetic testing equipment used in detecting flaws in iron and steel parts.

CHICAGO—Sciaky Bros., 11001 Cottage Grove avenue, is erecting plant for manufacture of electric resistance spot welders for aluminum. Building will be in Clearing Industrial district.

CHICAGO—Howard Aircraft Corp., 5301 West Sixty-fifth street, has broken ground for second plant under contract with the Army. Engineering Systems Inc., 221 North LaSalle street, is architect, and Illinois Hydraulic Stone & Construction Co., Elgin, Ill., contractor.

CHICAGO—D. O. James Mfg. Co., 1114 West Monroe stret, is making a two-story top addition to plant.

CHICAGO—Offner Electronics, 1133 East Sixty-third street, is building plant on northwest side of city to increase capacity for production of electronic instruments.

CHICAGO—Excelsior Die & Tool Works Inc., 2331 West Eighteenth street, is increasing capacity of its manufacturing building.

CHICAGO—Barkling Fuel Engineering Co., 402 North Paulina street, is making a major expansion to its plant consisting of increases in manufacturing area and office space.

CHICAGO—Drying Systems Inc., 1800 West Foster avenue, is constructing building for additional manufacturing area.

CHICAGO—Fred Hewitt Co. Inc., 5529 West Irving Park road, has been incorporated with 500 shares of common by F. Hewitt, M. Hewitt and A. Heisman, to deal in lathing materials, tools and machinery. Correspondent: Fred Hewitt, 5529 Irving Park road.

OTTAWA, ILL.—Burns Machine Co. will build an addition to its plant, doubling size of its present plant.

Tennessee

CENTREVILLE, TENN. — International Minerals & Chemical Corp., care of International Agricultural Co., 20 North Wacker drive, Chicago, plans erection of plants here.

Photo courtesy Minneapolis-Honeywell

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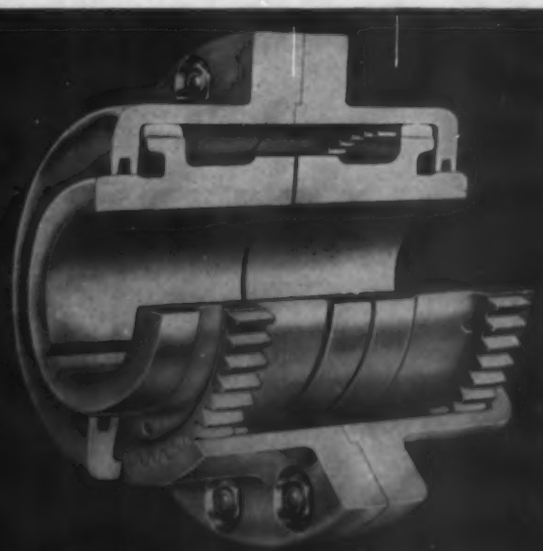

A COPY OF CATALOG GIVING FULL DESCRIPTION AND ENGINEERING DATA SENT UPON REQUEST.

FLEXIBLE COUPLINGS

POOLE FOUNDRY & MACHINE COMPANY WOODBERRY, BALTIMORE, MD.

Mississippi

LAUREL, MISS.—Masonite Corp. plans installation of $150,000 equipment at Laurel plant to reduce stream pollution.

Florida

MIAMI, FLA.—Witters Construction Co. 1745 Southwest Sixth street, has contract for addition to shop building for Shelley Tractor & Equipment Co.

Missouri

BLUE SPRINGS, MO.—Bids will be taken soon for waterworks improvements costing $76,000. Black & Veatch, 4706 Broadway, Kansas City, Mo., engineers.

NEOSHO, MO.—City has plans completed for water and sewer; work to include 2,500,000 gallons per day water filter plant; sewage plant improvements and water and sewer extensions. Cost $523,000.

Wisconsin

PORT WASHINGTON, WIS. — Modern Equipment Co. is building extension to plant to provide additional space for engineering and office use.

WHITEHALL, WIS.—Illinois Cooperage Mfg. Co., 220 South State street, Chicago, has let contract for one-story 60 x 100-foot factory to John Schneider, Independence, Wis.

Texas

DENISON, TEX.—Bell Oil & Gas Co. and Ben Franklin Refining Co., Denison, will take bids soon for high-octane refinery plant costing $800,000.

GRAND PRAIRIE, TEX.—City, G. H. Turner, mayor, received low bid at $75,000 for sewage treatment plant from B. G. Welburn, 1319 Wilbur street, Dallas. Burleson-Garrett Engineering Co., P. O. Box 788, engineer.

PASADENA, TEX.—Theodore Jensen has contract for sewage disposal plant costing approximately $159,630. Garrett Engineering Co., 3504 Audubon street, Houston, Tex., engineer.

California

LOS ANGELES—Weber Showcase & Fixture Co. is erecting a hydraulic press building at 5700 Avalon boulevard costing $12,000. The company is engaged in metal stamping work for the shipbuilding industry.

SAN FRANCISCO—Shell Chemical Co., 100 Bush street, plans erection of plant costing $15,000,000.

SOUTH GATE, CALIF.—National Tank & Mfg. Co. is building factory, warehouse and office building at 9001 Rayo avenue, South Gate, costing $48,000.

Washington

SEATTLE—Western Gear Works is building warehouse and assembly bay addition to plant at 422 Ninth avenue South.

SEATTLE—General Construction Co. is erecting $75,000 machine shop, 100 x 400 feet at plant of Todd Seattle Drydocks Inc., Seattle.

Canada

COOKSVILLE, ONT.—T. W. Hand Fireworks Co. Ltd., plans to start work at an early date on plant addition to cost about $85,000, including erection of 35 frame buildings and installation of three hydraulic presses as well as other equipment.

ELMIRA, ONT.—Naugatuck Chemicals Ltd. will erect plant here to cost about $130,000, equipment to include tanks, pumps, motors, dryers and electrical equipment.

ETOBICOKE TOWNSHIP, ONT.—Aluminum Co. of Canada Ltd., Sun Life building, Montreal, has begun preliminary work on plant here to cost $500,000 with equipment. A. W. Robertson Ltd., 57 Bloor street West, Toronto, has general contract.

KINGSTON, ONT.—Public utilities commission, C. C. Folger, manager, has called bids for transformer and switching building estimated to cost about $55,000 with equipment. Colin Drever, 81 Brock street, architect.

LEASIDE, ONT.—Small Electric Motors Ltd., Vanderhoof avenue, has given general contract to Carr & Barnes Ltd., 481 Eglington avenue West, Toronto, for plant addition to cost about $25,000. W. A. Johnston is manager.

MERRITTON, ONT.—Hayes Steel Products Ltd. is having plans prepared by A. E. Nicholson, architect, 46 Queen street, St. Catharines, for further addition to plant here.

OTTAWA, ONT.—Laurentian Air Services Ltd., P. O. Box 71, has given general contract to George A. Crain & Son, 285 Clemow avenue, for plant addition. A. B. MacLaren is general manager. (Noted June 29).

PETROLIA, ONT.—Canadian Oil Companies Ltd., Terminal Warehouse building, Toronto, will start work soon on plant addition here to cost about $25,000.

PORT ARTHUR, ONT.—Port Arthur Shipbuilding Co. Ltd., C. F. McDougall, manager, will erect plant at Current River to cost about $15,000. C. D. Howe Co. Ltd., Public Utilities building, Port Arthur, engineer.

TORONTO, ONT.—Dow Chemical Co. of Canada Ltd., 159 Bay street, has given general contracts to Anglin-Norcross Ltd., 57 Bloor street West, and to Pigott Construction Co. Ltd., Pigott building, Hamilton, in connection with two plants to be erected in Ontario to cost approximately $500,000.

WINDSOR, ONT.—Truscon Steel Co. of Canada Ltd., 1309 Walker road, is considering plans for further plant addition to cost about $15,000.

LACHINE, QUE.—Dominion Engineering Works Ltd., First avenue, has given general contract to Hyde & Miller Ltd., 1500 Guy street, for further plant extension to cost about $85,000, the new work to include furnace room, repair of coke ovens and other enlargements.

MONTREAL, QUE.—Sicard Limitee, 2055 Bennett avenue, plans to start work soon on plant addition to cost $35,000 with equipment.

RAPIDS BLANC, QUE. — Shawinigan Water & Power Co., 107 Craig street West, Montreal, has given general contract to Shawinigan Engineering Co. Ltd., 107 Craig street West, Montreal, for fifth 40,000-horsepower unit in power plant to cost $1,000,000, and a fifth 44,500-horsepower unit to be installed in plant at La Tugue, Que., to cost about $1,000,000.

ROCK ISLAND, QUE.—Union Twist Drill Co. Ltd. is having plans prepared for further addition to plant to cost about $300,000 in which equipment will be installed at cost of about $650,000.

SHAWINIGAN FALLS, QUE.—Canadian Carborundum Co. Ltd. has let contracts and will begin work on plant and installation of equipment to cost about $250,000. John F. Wickenden, Ameau building, Three Rivers, Que., has general contract.

MOOSE JAW, SASK.—British American Oil Co. Ltd., Royal Bank building, Toronto, plans to start work soon on addition to plant here and install new equipment to cost about $500,000.

NORTH VANCOUVER, B. C.—North Van Ship Repairs Ltd., 171 West Esplanade, will erect plant addition to cost about $365,000. Work to include additional plate fabricating capacity, installation of pneumatic tools, electric welding machines, and additional electrical facilities.

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Hydropress, Inc., 370 Lexington Ave., New York City.
Logemann Brothers Co., 3124 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

ACETYLENE
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.

ACID-PROOF LININGS
Ceilcote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

ACIDS (Pickling)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

ADHESIVES
Avery Adhesives, 451 E. 3rd St., Los Angeles, Cal.

AEROCASING
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.

AIR COMPRESSORS—See COMPRESSORS (Air)

AIR CONDITIONING EQUIPMENT
American Air Filter Co., 443 Central Ave., Louisville, Ky.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

AIRCRAFT ACCESSORIES, PARTS, SUPPLIES
Spriesch Tool & Mfg. Co., 10 Howard St., Buffalo, N. Y.

AIRLESS BLAST CLEANING EQUIPMENT
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Vapor Blast Mfg. Co., 333 S. 16th St., Milwaukee, Wis.

ALKALI CLEANING COMPOUNDS
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

ALLOYS (Corrosion & Abrasive Resistant)
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

ALLOYS—See FERROALLOYS

ALLOYS (Magnesium)
Dow Chemical Co., Midland, Mich.

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANNEALING (Tempering)
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.

ANNEALING BOXES—See BOXES (Annealing)

ANNEALING COVERS
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

ANODES (All Types)
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

ANODES (Nickel)
Seymour Manufacturing Co., The, Seymour, Conn.

AXLES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BALANCING MACHINES
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.

BALING PRESSES
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BALL TRANSFERS
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

BALLS (Brass or Bronze)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Strom Steel Ball Co., 1850 S. 54th Ave., Cicero, Ill.

BALLS (Special Alloy Metals)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

BALLS (Steel)
(*Also Stainless)
*Strom Steel Ball Co., 1850 S. 54th Ave., Cicero, Ill.

BAND FILES (Metal)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

BAND SAWS (Metal Cutting)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Walker-Turner Co., Inc., 5063 Berckman St., Plainfield, N. J.

BANDS—See HOOPS AND BANDS

BANDS (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BAR BENDERS
Kardong Bros. Inc., 346 Buchanan St., Minneapolis, Minn.

BARGE MOVERS
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bravo Corp. (Engin'r'g Works Div.) Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Maryland Dry Dock Co., Baltimore, Md.

BARREL DUMPERS
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

BARRELS (Plating)
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

BARRELS (Steel)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

BARS (Alloy)
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
International Nickel Co. Inc., The, 67 Wall Street, New York City.
LaSalle Steel Co., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

BARS (Brass, Bronze or Copper)
American Brass Co., The, Waterbury, Conn.
Copperweld Steel Co., Warren, O.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

BARS (Concrete Reinforcing)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BARS (Iron)—See IRON (Bar)

BARS (Steel)
(*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
*Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
*Copperweld Steel Co., Warren, O.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
*Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.

BARS (Steel)—Con.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BATHS (Heat Treating-High Speed)
Holden, A. F., Co., The, 200 Winchester Ave., New Haven, Conn.

BATTERIES (Storage)
Edison Storage Battery Div. of Thomas A. Edison, Inc., West Orange, N. J.
Electric Storage Battery Co., The, 19th St. and Allegheny Ave., Philadelphia, Pa.
Graybar Electric Co., 420 Lexington Ave., New York City.

BATTERY CHARGING APPARATUS
Cutler-Hammer, Inc., 1211 St. Paul, Ave., Milwaukee, Wis.
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

BEAMS, CHANNELS, ANGLES, ETC.
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dow Chemical Co., Midland, Mich.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Levinson Steel Co., The, 33 Pride St., Pittsburgh, Pa.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BEARINGS (Ball)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Torrington Co., The, Torrington, Conn.

BEARINGS (Babbitt)
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

BEARINGS (Brass, Bronze)
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., 404 W. Third St., Dover, O.

BEARINGS (Graphite)
United States Graphite Co., The, Saginaw, Mich.

BEARINGS (Journal)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Rollway Bearing Co., Inc., 541 Seymour Ave., Syracuse, N. Y.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Needle)
Torrington Co., The, Torrington, Conn.

BEARINGS (Non-Metallic)
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

BEARINGS (Oilless)
Rhoades, R. W., Metaline Co., 43 Third St., Long Island City, N. Y.

BEARINGS (Quill)
Bantam Bearings Corp., South Bend, Ind.

BEARINGS (Radial)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.
Rollway Bearing Co., Inc., 541 Seymour Ave., Syracuse, N. Y.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roll Neck)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Harrison, N. J.
Hyatt Bearings Div. General Motors Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Rollway Bearing Co., Inc., 541 Seymour Ave., Syracuse, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Rollway Bearing Co., Inc., 541 Seymour Ave., Syracuse, N. Y.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller Tapered)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Rollway Bearing Co., Inc., 541 Seymour, Ave., Syracuse, N. Y.

BEARINGS (Rolling Mill)
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Shaft Hangers)
Rollway Bearing Co., Inc., 541 Seymour Ave., Syracuse, N. Y.

BEARINGS (Thrust)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Rollway Bearing Co., Inc., 541 Seymour Ave., Syracuse, N. Y.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BELTING (Chain and Link)
Jeffrey Mfg. Co., 956 N. Fourth St., Columbus, O.
Link-Belt Co., 220 So. Belmont Ave., Indianapolis, Ind.

BELTING (Metal, Conveyor, High and Low Temperature)
Cyclone Fence Co., Waukegan, Ill.

BELTING (Rubber)
United States Rubber Co., 1230 Sixth Ave., New York City.

BENDING AND STRAIGHTENING MACHINES
Alliance Machine Co., The, Alliance, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Kardong Bros., Inc., 346 Buchanan St., Minneapolis, Minn.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
O'Neil-Irwin Mfg. Co., 304 8th Ave. So., Minneapolis, Minn.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
Webb City & Carterville Foundry & Machine Works, Webb City, Mo.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BILLETS (Alloys and Carbon Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Firth-Sterling Steel Co., McKeesport, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.

BILLETS (Forging)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Copperweld Steel Co., Warren, O.
Heppenstall Co., Box S-8, 4620 Hatfield St., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

BILLETS AND BLOOMS (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Steel Corp., Kokomo, Ind.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BLACKING (Graphite)
United States Graphite Co., The, Saginaw, Mich.

BLAST CLEANING EQUIPMENT (Sand)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Vapor Blast Mfg. Co., 333 S. 16th St., Milwaukee, Wis.

BLAST FURNACE AIR CONDITIONING
Pritchard, J. F., & Co., Dwight Bldg., Kansas City, Mo.

BLAST FURNACE CLEANING (Gas)
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Peabody Engineering Corp., 580 Fifth Ave., New York City.

BLAST FURNACE HOT BLAST STOVES
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Broslus, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Pritchard, J. F., & Co., Dwight Bldg., Kansas City, Mo.

BLAST FURNACE STOCK HOUSES
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Reading Chain & Block Corp., Dept. B-7, Reading, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

BLOWERS
General Electric Co., Schenectady, N. Y.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

BLOWPIPES (Oxy-Acetylene)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

BLUE PRINTING MACHINES
Wickes Brothers, Saginaw, Mich.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOILERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Oil Well Supply Co., Dallas, Texas

BOLT AND NUT MACHINERY
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., The, Tiffin, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

WHERE-TO-BUY

BOLTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

BOLTS (Carriage and Machine)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

BOLTS (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

BOLTS (Special)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS (Stove)
Central Screw Co., 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BOLTS (Stove, Recessed Head)
American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

BOLTS (Track)—See TRACK BOLTS

BORING MACHINES (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.
National Automatic Tool Co., The, Richmond, Ind.
Ohio Machine Tool Co., The, Kenton, O.
Sellers, William, & Co., Inc., 16th & Callowhill Sts., Philadelphia, Pa.

BORING MILLS (Automatic Control for)
Detroit Universal Duplicator Co., 218 St. Aubin, Detroit, Mich.

BORING TOOLS (Carbide Tipped)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

BOXES (Annealing)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
National-Erie Corp., Erie, Pa.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Union Steel Casting Div. of Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 20005 Lake Rd., Cleveland, O.

BOXES (Open Hearth Charging)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

BRAKE LININGS
Johns-Manville Corp., 22 E. 40th St., New York City.

BRAKES (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

BRAKES (Hand)
O'Neil-Irwin Mfg. Co., 304 8th Ave. So., Minneapolis, Minn.

BRAKES (Press)
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.

BRICK (Acid Resisting)
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Quigley Co., 56 W. 45th St., New York City.

BRICK (Chrome)
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Hubbard, M. D., Spring Co., 444 Central Ave., Pontiac, Mich.
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Dravo Corp. (Engineering Works Div.), Neville Island, Pittsburgh, Pa.
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Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

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Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

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American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 W. Carroll Ave., Chicago, Ill.
Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., Dept. B-7, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

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Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Cullen-Friestedt Co., 1306 So. Kilbourn Ave., Chicago, Ill.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Reading Chain & Block Corp., Dept. B-7, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

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Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

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Cleveland Crane & Engineering Co., The, 1125 E. 283rd St., Wickliffe, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, O.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. B-7, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
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Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
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Chicago Tramrail Co., 2910 W. Carroll Ave., Chicago, Ill.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, O.
Reading Chain & Block Corp., Dept. B-7, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

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Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, O.
Reading Chain & Block Corp., Dept. B-7, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

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Bethlehem Steel Co., Bethlehem, Pa.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

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Gruendler Crusher & Pulverizer Co., 2920-28 N. Market St., St. Louis, Mo.

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Bissett Steel Co., The, 945 E. 67th St., Cleveland, O.
Heppenstall Co., Box S-8, 4620 Hatfield St., Pittsburgh, Pa.
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Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.

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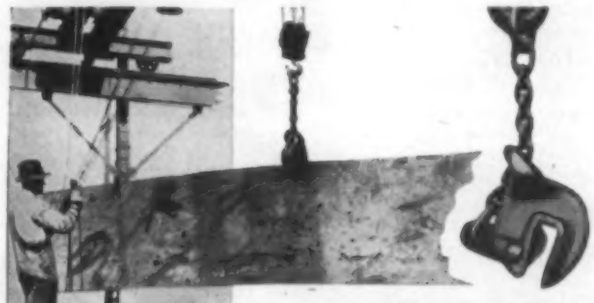

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FORGINGS (Iron and Steel) (*Also Stainless)
*Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
Heppenstall Co., Box S-8, 4620 Hatfield St., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
Oil Well Supply Co., Dallas, Texas.
Phoenix Manufacturing Co., Joliet, Ill.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Small)
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
Phoenix Manufacturing Co., Joliet, Ill.

FORGINGS (Upset)
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Co., Bethlehem, Pa.
Phoenix Manufacturing Co., Joliet, Ill.

FOUNDRY EQUIPMENT
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Vapor Blast Mfg. Co., 333 S. 16th St., Milwaukee, Wis.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

FURNACES (Brazing)
Bellis Heat Treating Co., Branford, Conn.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Electric Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.

WHERE-TO-BUY

FURNACES (Electric Melting)—Con.
Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.
General Electric Co., Schenectady, N. Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Swindell-Dressler Corp., P.O. Box 1888, Pittsburgh, Pa.

FURNACES (Enameling)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

FURNACES (Forging)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
R-S Products Corp., 123 Berkley St., Philadelphia, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Galvanizing)
Salem Engineering Co., 714 So. Broadway, Salem, O.

FURNACES (Gas or Oil)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
R-S Products Corp., 123 Berkley St., Philadelphia, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Bellis Heat Treating Co., Branford, Conn.
Carborundum Co., The, Perth Amboy, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Holden, A. F., Co., The, 200 Winchester Ave., New Haven, Conn.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Ohio Crankshaft Co., The, 6600 Clement Ave., Cleveland, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
R-S Products Corp., 132 Berkley St., Philadelphia, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

FURNACES (Laboratory)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Dietert, Harry W., Co., 9330J Roselawn Ave., Detroit, Mich.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Non-Ferrous Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.

FURNACES (Open Hearth)
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Portable)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

FURNACES (Recuperative)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Rivet Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 20005 Lake Rd., Cleveland, O.

FURNACES (Steel Mill)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.
Wilson, Lee, Engineering Co., 20005 Lake Rd., Cleveland, O.

FURNACES (Welding)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

GAGE BLOCKS
Dearborn Gage Co., 22036 Beech St., Dearborn, Mich.

GAGES
Brown & Sharpe Mfg. Co., Providence, R. I.
Federal Products Corp., 1144 Eddy St., Providence, R. I.
Greenfield Tap & Die Corp., Greenfield, Mass.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Sheffield Corp., The, Gage Div., Dayton, O.

GAGES (Automatic Control & Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

GAGES (Indicating and Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
General Electric Co., Schenectady, N. Y.
Sheffield Corp., The, Gage Div., Dayton, O.

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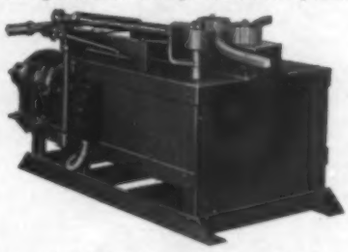

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GAGES (Pressure & Vacuum Recording)
Bristol Co., The,
112 Bristol Rd., Waterbury, Conn.

GAGES (Thread-Ring & Plug)
Detroit Tap & Tool Co.,
8432 Butler St., Detroit, Mich.

GALVANIZING (Hot Dip)
Acme Galvanizing, Inc.,
Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., American Bank Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co.,
2525 E. Cumberland St.,
Philadelphia, Pa.
Fanner Mfg. Co., The,
Cleveland, O.
Finn, John, Metal Works,
San Francisco, Calif.
Galvanizers Incorporated,
Portland, Ore.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co.,
5515 Butler St., Pittsburgh, Pa.
Hill, James, Mfg. Co., Providence, R. I.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co.,
Newark, N. J.
International-Stacey Corp.,
Columbus, O.
Isaacson Iron Works, Seattle, Wash.
Joslyn Co. of California,
Los Angeles, Calif.
Joslyn Mfg. & Supply Co.,
Chicago, Ill.
Koven, L. O., & Bro., Inc.,
Jersey City, N. J.
Lehigh Structural Steel Co.,
Allentown, Pa.
Lewis Bolt & Nut Co.,
Minneapolis, Minn.
Missouri Rolling Mill Corp.,
St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works, San Francisco, Calif.
Sanitary Tinning Co., The,
Cleveland, O.
Scaife Co., Ann St.,
Oakmont, Pa.
Standard Galvanizing Co.,
Chicago, Ill.
Wilcox, Crittenden & Co., Inc.,
Middletown, Conn.
Witt Cornice Co., The,
Cincinnati, O.

GALVANIZING PLANTS FOR SHEETS
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Warren, O.

GALVANIZING PRODUCTS
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.

GAS HOLDERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co.,
Bethlehem, Pa.
Western Gas Div., Koppers Co.,
Fort Wayne, Ind.

GAS PRODUCER PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Morgan Construction Co.,
Worcester, Mass.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

GAS RECOVERY COKE OVENS AND GAS PLANTS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

GAS SCRUBBERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Peabody Engineering Corp.,
580 Fifth Ave., New York City.
Western Gas Div., Koppers Co.,
Fort Wayne, Ind.

GASKETS (Asbestos, Metal or Rubber)
Johns-Manville Corp.,
22 E. 40th St., New York City.

GEAR BLANKS
Ampco Metal, Inc., Dept. S-7,
3830 W. Burnham St.,
Milwaukee, Wis.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
Philadelphia Gear Works,
Erie Ave. & G St.,
Philadelphia, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Waldron, John, Corp.,
New Brunswick, N. J.

GEAR MACHINERY (Generating)
National Broach & Machine Co.,
5600 St. Jean, Detroit, Mich.

GEAR MACHINERY (Lapping, Finishing, Checking)
Michigan Tool Co., 7171 E.
McNichols Rd., Detroit, Mich.

GEARS (Non-Metallic)
Chicago Rawhide Mfg. Co.,
1306 Elston Ave., Chicago, Ill.
Pittsburgh Gear & Machine Co.,
2680-2700 Smallman St.,
Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The,
25th St., Pittsburgh, Pa.

GEARS (Steel Laminated)
Simonds Gear & Mfg. Co., The,
25th St., Pittsburgh, Pa.
Waldron, John, Corp.,
New Brunswick, N. J.

GEARS (Worm)
Cleveland Worm & Gear Co.,
3270 E. 80th St., Cleveland, O.
Horsburgh & Scott Co., The,
5112 Hamilton Ave., Cleveland, O.
Michigan Tool Co., 7171 E.
McNichols Rd., Detroit, Mich.
Philadelphia Gear Works,
Erie Ave. & G St.,
Philadelphia, Pa.
Pittsburgh Gear & Machine Co.,
2680-2700 Smallman St.,
Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The,
25th St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING
Foote, Brad, Gear Works, Cicero, Ill.
General Electric Co.,
Schenectady, N. Y.
Grant Gear Works,
2nd & B Sts., Boston, Mass.
Horsburgh & Scott Co., The,
5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co.,
1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co.,
4437 Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Michigan Tool Co., 7171 E.
McNichols Rd., Detroit, Mich.
National-Erie Corp., Erie, Pa.
Philadelphia Gear Works,
Erie Ave. & G St.,
Philadelphia, Pa.
Pittsburgh Gear & Machine Co.,
2680-2700 Smallman St.,
Pittsburgh, Pa.
Simonds Gear & Mfg. Co.,
25th St., Pittsburgh, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

GENERATING SETS
Century Electric Co.,
1806 Pine St., St. Louis, Mo.
Cooper-Bessemer Corp., The,
Mt. Vernon, O.
Fairbanks, Morse & Co.,
600 So. Michigan Ave.,
Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reliance Electric & Eng. Co.,
1088 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Acetylene—Portable and Stationary)
Linde Air Products Co., The,
30 E. 42nd St., New York City.

GENERATORS (Electric)
Allis-Chalmers Mfg. Co.,
Milwaukee, Wis.
Century Electric Co.,
1806 Pine St., St. Louis, Mo.
Fairbanks, Morse & Co.,
600 S. Michigan Ave.,
Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The,
Cleveland, O.
Reliance Electric & Eng. Co.,
1088 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Plating)
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

GRABS—FOR SHEETS, COILS, INGOTS
J-B Engineering Sales Co.,
3100 East St., New Haven, Conn.

GRAPHITE
United States Graphite Co., The,
Saginaw, Mich.

GRATING
Blaw-Knox Co., Blawnox, Pa.
Dravo Corp., (Machinery Div.),
300 Penn Ave., Pittsburgh, Pa.
Tri-Lok Co., 5515 Butler St.,
Pittsburgh, Pa.

GREASE (Lubricating)—See LUBRICANTS (Industrial)

GREASE RETAINERS AND SEALS
Chicago Rawhide Mfg. Co.,
1306 Elston Ave., Chicago, Ill.

GRINDER CENTERS
McKenna Metals Co.,
200 Lloyd Ave., Latrobe, Pa.

GRINDER HEADS
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDERS (Circular Saw)
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

GRINDERS (Foundry Core)
Milwaukee Foundry Equipment Co.,
3238 W. Pierce St.,
Milwaukee, Wis.

GRINDERS (Precision Thread)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co.,
Springfield, Vt.

GRINDERS (Sheet Steel & Internal Tube)
Mattison Machine Works,
Rockford, Ill.

GRINDERS (Single Slide Internal)
Bryant Chucking Grinder Co.,
Springfield, Vt.

GRINDERS (Surface)
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Heald Machine Co.,
Worcester, Mass.
Mattison Machine Works,
Rockford, Ill.
Norton Company, Worcester, Mass.

GRINDING (Shear Knife)
American Shear Knife Co.,
3rd & Ann Sts., Homestead, Pa.

GRINDING COMPOUNDS
Stuart, D. A., Oil Co., Ltd.,
2733 S. Troy St., Chicago, Ill.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Wayne Chemical Products Co.,
9202 Copeland St., Detroit, Mich.

GRINDING MACHINE ATTACHMENTS
Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Automotive Reconditioning)
Heald Machine Co.,
Worcester, Mass.

GRINDING MACHINES (Bench & Floor Type)
Walker-Turner Co., Inc.,
5062 Berckman St.,
Plainfield, N. J.

GRINDING MACHINES (Centerless, Internal and External)
Cincinnati Milling Machine and Cincinnati Grinders, Inc.,
Oakley Sta., Cincinnati, O.
Heald Machine Co.,
Worcester, Mass.

GRINDING MACHINES (Chucking)
Cincinnati Milling Machine and Cincinnati Grinders, Inc.,
Oakley Sta., Cincinnati, O.
Fitchburg Grinding Machine Corp.,
Fitchburg, Mass.
Heald Machine Co.,
Worcester, Mass.

GRINDING MACHINES (Crank Pin, Cam, Piston, Valve Face)
Cincinnati Milling Machine and Cincinnati Grinders, Inc.,
Oakley Sta., Cincinnati, O.
Norton Company, Worcester, Mass.

GRINDING MACHINES (Die)
Fitchburg Grinding Machine Corp.,
Fitchburg, Mass.

GRINDING MACHINES (Gear)
Fitchburg Grinding Machine Corp.,
Fitchburg, Mass.

GRINDING MACHINES (Oscillating)
Cincinnati Milling Machine and Cincinnati Grinders, Inc.,
Oakley Sta., Cincinnati, O.

GRINDING MACHINES (Plain and Universal)
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc.,
Oakley Sta., Cincinnati, O.
Fitchburg Grinding Machine Corp.,
Fitchburg, Mass.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Roll)
Cincinnati Milling Machine and Cincinnati Grinders, Inc.,
Oakley Sta., Cincinnati, O.
Mesta Machine Co., P. O. Box 1466
Pittsburgh, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Rotary Surface)
Blanchard Machine Co., The,
64 State St., Cambridge, Mass.
Heald Machine Co.,
Worcester, Mass.

GRINDING MACHINES (Segmental)
Norton Company,
Worcester, Mass.

GRINDING MACHINES (Spline)
Fitchburg Grinding Machine Corp.,
Fitchburg, Mass.

GRINDING MACHINES (Tool and Cutter)
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc.,
Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Fitchburg Grinding Machine Corp.,
Fitchburg, Mass.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
Norton Co., Worcester, Mass.
Oster Mfg. Co., The,
2037 E. 61st St., Cleveland, O.
Sellers, William, & Co., Inc.,
16th & Callowhill Sts.,
Philadelphia, Pa.

GRINDING WHEELS
Abrasive Co.,
Tacony & Fraley Sts.,
Philadelphia, Pa.
Atkins, E. C., & Co.,
427 So. Illinois St.,
Indianapolis, Ind.
Bay State Abrasive Products Co.,
Westboro, Mass.
Blanchard Machine Co., The,
64 State St., Cambridge, Mass.
Carborundum Co., The,
Niagara Falls, N. Y.
DeSanno, A. P., & Son Inc.,
436 Wheatland St.,
Phoenixville, Pa.
Macklin Co., Jackson, Mich.
Norton Co., Worcester, Mass.
Sterling Grinding Wheel Div.,
Cleveland Quarries Co., Tiffin, O.

GRINDING WHEELS (Segmental)
Abrasive Co.,
Tacony & Fraley Sts.,
Philadelphia, Pa.
Blanchard Machine Co., The,
64 State St., Cambridge, Mass.
Carborundum Co., The,
Niagara Falls, N. Y.
Macklin Co., Jackson, Mich.
Sterling Grinding Wheel Div.,
Cleveland Quarries Co., Tiffin, O.

GUIDE SHOES
Youngstown Alloy Casting Corp.,
103 E. Indianola Ave.,
Youngstown, O.

GUIDES (Mill)
Ampco Metal, Inc., Dept. S-7,
3830 W. Burnham St.,
Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Youngstown Alloy Casting Corp.,
103 E. Indianola Ave.,
Youngstown, O.

GUNS (Blast Furnace Mud)
Bailey, Wm. M., Co.,
702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

GUNS (Steam, Hydraulic, Electric)
Bailey, Wm. M., Co.,
702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

HAMMERS (Drop)
Alliance Machine Co., The, Alliance, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HAMMERS (Power)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

HAMMERS (Steam)
Alliance Machine Co., The, Alliance, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HANGERS
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HANGERS (Shaft)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HEADING MACHINERY
National Machinery Co., Tiffin, O.

HEAT TREATING
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.
Van Dorn Iron Works, 2685 E. 79th St., Cleveland, O.

HEAT TREATING MATERIALS
Houghton, E. F., & Co., Third, American & Somerset Sts., Philadelphia, Pa.
Park Chemical Co., 8076 Military Ave., Detroit, Mich.

HEATERS (Air)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

HEATERS (Electric Space)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

HEATERS (Unit)
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.

HELMETS (Blast Cleaning)
Pangborn Corp., Hagerstown, Md.

HITCHINGS (Mine Car)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOBS
Brown & Sharpe Mfg. Co., Providence, R. I.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

HOISTS (Chain)
Cleveland Tramrail Div., of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Ford Chain Block Div. of American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Corp., Dept. B-7, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. B-7, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Hand)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

HOISTS (Monorail)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reading Chain & Block Corp., Dept. B-7, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.

HONING MACHINES
Micromatic Hone Corp., 1345 E. Milwaukee Ave., Detroit, Mich.

HOOKS (Chain)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOOPS AND BANDS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

HOSE REINFORCEMENT MACHINES
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.

HOSE (Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.
Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.

HOSE (Rubber)
United States Rubber Co., 1230 Sixth Ave., New York City.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I.

HYDRAULIC MACHINERY
Alliance Machine Co., The, Alliance, O.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydropress, Inc., 570 Lexington Ave., New York City.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Weinman Pump & Supply Co., The, 210 Boulevard of the Allies, Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

HYDRAULIC UNITS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Racine Tool & Machine Co., Racine, Wis.
Weinman Pump & Supply Co., The, 210 Boulevard of the Allies, Pittsburgh, Pa.

INDICATORS (Blast Furnace Stock Line)
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

INDICATORS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

INGOT MOLD WASH (Graphite)
United States Graphite Co., The, Saginaw, Mich.

INGOT MOLDS
Bethlehem Steel Co., Bethlehem, Pa.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Valley Mould & Iron Corp., Hubbard, O.

INHIBITORS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.

INSPECTION TOOLS
Scherr, George, Co., 126 Lafayette St., New York City.

INSTRUMENTS (Electric-Indicating and Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

INSULATING BLOCK
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING BRICK
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING CONCRETE
Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Quigley Co., 56 W. 45th St., New York City.

INSULATING POWDER AND CEMENT
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Building)
Carey, Philip, Mfg. Co., The, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Quigley Co., 56 W. 45th St., New York City.

IRON (Bar)
Ryerson, Jos. T., & Son Co., 16th & Rockwell Sts., Chicago, Ill.

IRON ORE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Pickands Mather & Co., Union Commerce Bldg., Cleveland, O.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

JIG BORERS
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

KETTLES (Galvanizing)
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

KEYS (Machine or Woodruff)
Moltrup Steel Products Co., Beaver Falls, Pa.

KNIVES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

LABORATORY EQUIPMENT
Dietert, Harry W., Co., 9330J Roselawn Ave., Detroit, Mich.

LABORATORY WARE
Bay State Abrasive Products Co., Westboro, Mass.
Norton Company, Worcester, Mass.

LADLES
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

LAPPING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Norton Company, Worcester, Mass.

LARRIES (Coal)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

LATHE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

LATHE DOGS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

LATHE TOOLS (Carbide Tipped)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

LATHES
Hepburn American Co., Maher Bldg., Greenwich, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., The, Dept. J-2, Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
Morey Machinery Co., Inc., 410 Broome St., New York City.
South Bend Lathe Works, Dept. 866, South Bend, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Automatic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.

LATHES (Automatic)—Con.
Monarch Machine Tool Co., Sidney, O.

LATHES (Automatic Controls for)
Detroit Universal Duplicator Co., 218 St. Aubin, Detroit, Mich.

LATHES (Buffing & Polishing)
Walker-Turner Co., Inc., 5061 Berckman St., Plainfield, N. J.

LATHES (Chucking)
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Hepburn American Co., Maher Bldg., Greenwich, Conn.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

LATHES (Crankshaft)
Wickes Brothers, Saginaw, Mich.

LATHES (Engine)
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, Dept. 886, South Bend, Ind.
Wickes Brothers, Saginaw, Mich.

LATHES (Railroad Car & Driving Wheel)
Sellers, William, & Co., Inc., 16th & Callowhill Sts., Philadelphia, Pa.

LATHES (Roll Turning)
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Turret)
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Company, The, Bridgeport, Conn.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LEAD (Tellurium)
National Lead Co., 111 Broadway, New York City.

LENSES (Illuminated)
Pike, E. W., & Co., 492 North Ave., Elizabeth, N. J.

LEVELING MACHINES
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Hydropress, Inc., 570 Lexington Ave., New York City.
McKay Machine Co., Youngstown, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

LIFTERS (Hand & Electric)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

LIFTERS (Machine Shop)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

LIFT TRUCKS—See TRUCKS (Lift)

LIFTING MAGNETS—See MAGNETS (Lifting)

LIGHTING (Industrial)
Graybar Electric Co., 420 Lexington Ave., New York City.

LINERS (Pump and Cylinder)
Shenango-Penn Mold Co., 404 W. Third St., Dover, O.

LOCOMOTIVE CRANES—See CRANES (Locomotive)

LOCOMOTIVES (Diesel-Electric)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Diesel Mechanical)
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Electric)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Electric Trolley)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Fireless)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Gasoline-Electric)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gasoline Mechanical)
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Oil-Electric)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

LOCOMOTIVES (Steam)
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Storage Battery)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Switching and Transfer)
Cooper-Bessemer Corp., The, Mt. Vernon, O.

LUBRICANTS (Graphite)
Acheson Colloids Corp., Port Huron, Mich.
United States Graphite Co., The, Saginaw, Mich.

LUBRICANTS (Industrial)
Acheson Colloids Corp., Port Huron, Mich.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Houghton, E. F., & Co., Third, American & Somerset Sts., Philadelphia, Pa.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Sinclair Refining Co., 630 Fifth Ave., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Stuart, D. A., Oil Co., Ltd., 2733 So. Troy St., Chicago, Ill.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

LUBRICATING SYSTEMS
Farval Corp., The, 3270 E. 80th St., Cleveland, O.

MACHINE WORK
American Metal Products Co., 5959 Linsdale Ave., Detroit, Mich.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Federal Shipbuilding & Dry Dock Co., Kearny, N. J.
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Scaiffe Co., Ann St., Oakmont, Pa.

MACHINERY (Flexible Shaft)
Walker-Turner Co., Inc., 5062 Berckman St., Plainfield, N. J.

MACHINERY (Special)
Alliance Machine Co., The, Alliance, O.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Bayard, M. L., & Co., 20th & Indiana Ave., Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Cleveland Automatic Machine Co., 2269 Ashland Ave., Cleveland, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.
Greenlee Bros. & Co., Rockford, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hepburn American Co., Maher Bldg., Greenwich, Conn.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Sellers, William, & Co., Inc., 16th & Callowhill Sts., Philadelphia, Pa.
Shuster, F. B., Co., The, New Haven, Conn.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

MACHINERY (Used & Rebuilt)
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
Galbreath Machinery Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 No. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago, Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

MAGNESIA (Electrically Fused)
Norton Co., Worcester, Mass.

MAGNESIA-REFRACTORIES
Basic Refractories, Inc., Hanna Bldg., Cleveland, Ohio.

MAGNESIUM
Dow Chemical Co., Midland, Mich.

MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)

MAGNETS (Lifting)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MAGNETS (Separating)
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MANGANESE METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

MANGANESE ORE
Cuban-American Manganese Corp., 122 E. 42nd St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

MANIPULATORS
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

MANIPULATORS (Forging)
Alliance Machine Co., The, Alliance, O.

MARKING DEVICES
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.
Matthews, James H., & Co., 3978 Forbes St., Pittsburgh, Pa.

METAL (Perforated)—See PERFORATED METAL

METAL BLAST ABRASIVES (Shot and Grit)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh, Pa.
Vapor Blast Mfg. Co., 333 S. 16th St., Milwaukee, Wis.

METAL CLEANERS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Houghton, E. F., & Co., Third, American & Somerset Sts., Philadelphia, Pa.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles, Calif.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

METAL CLEANING MACHINES
Ransohoff, N., Inc., Elmwood Place, Cincinnati, O.

METAL DUPLICATION (Without Dies)
O'Neil-Irwin Mfg. Co., 304 8th Ave. So., Minneapolis, Minn.

METAL FINISHES
American Nickeloid Co., 1310 N. Second St., Peru, Ill.

METAL FORMING MACHINERY
O'Neil-Irwin Mfg. Co., 304 8th Ave., So., Minneapolis, Minn.

METAL SPECIALTIES AND PARTS—See STAMPINGS

METAL STAMPINGS—See STAMPINGS

METALS (Nonferrous)
American Brass Co., The, Waterbury, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York City.

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.

MILL BUILDINGS
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.

MILLING CUTTERS
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

MILLING MACHINES
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Ohio Machine Tool Co., The, Kenton, O.
Sellers, William, & Co., Inc., 16th & Callowhill Sts., Philadelphia, Pa.

MILLING MACHINES (Automatic Controls for)
Detroit Universal Duplicator Co., 218 St. Aubin, Detroit, Mich.

WHERE-TO-BUY

MILLING MACHINES (Milling and Centering Combined)
Jones & Lamson Machine Co., Springfield, Vt.

MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT

MOLDING MACHINERY (Foundry)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

MOLDINGS (Metal)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

MOLDS (Ingot)—See INGOT MOLDS

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York City.
Molybdenum Corp. of America, Grant Bldg., Pittsburgh, Pa.

MONEL METAL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

MONORAIL SYSTEMS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Reading Chain & Block Corp., Dept. B-7, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 353 Schuyler Ave., Montour Falls, N. Y.

MOTOR-ROLLERS
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

MOTORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Century Electric Co., 1806 Pine St., St. Louis, Mo.
Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1088 Ivanhoe Rd., Cleveland, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Walker-Turner Co., Inc., 5063 Berckman St., Plainfield, N. J.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

MUCK BAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

NAILS (*Also Stainless)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Hassall, John, Inc., 402 Oakland St., Brooklyn, N. Y.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

NAILS (Coated and Galvanized)
Wickwire Brothers, 189 Main St., Cortland, N. Y.

NAME PLATES
Avery Adhesives, 451 E. 3rd St., Los Angeles, Cal.

NICKEL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

NICKEL (Shot)
International Nickel Co., Inc., The, 67 Wall St., New York City.

NICKEL STEEL (Cold Drawn)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Republic Steel Co., Dept. ST, Cleveland, O.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

NOZZLES (Blasting)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.
Vapor Blast Mfg. Co., 333 S. 16th St., Milwaukee, Wis.

NUTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Elastic Stop Nut Corp., 2367 Vauxhall Rd., Union, N. J.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

NUTS (Castellated)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Machine Screw)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.

NUTS (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

NUTS (Self Locking)
Elastic Stop Nut Corp., 2367 Vauxhall Rd., Union, N. J.

NUTS (Semi-Finished)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Wing)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

OIL RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

OILS (Cutting)
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Sinclair Refining Co., 630 Fifth Ave., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Stuart, D. A., Oil Co. Ltd., 2733 So. Troy St., Chicago, Ill.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Quenching)
Park Chemical Co., 8076 Military Ave., Detroit, Mich.

OILS (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.

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OVENS (Gas or Oil Heat)
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

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Carey, Philip, Mfg. Co., The, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.
United States Rubber Co., 1230 Sixth Ave., New York City.

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Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

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Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

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American Chemical Paint Co., Dept. 310, Ambler, Pa.
Quigley Co., 56 W. 45th St., New York City.

PAINT (Industrial)
Carey, Philip, Mfg. Co., The, Lockland, Cincinnati, O.

PAINT (Marking)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PARTS (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PATTERNS (Wood or Metal)
Wellman Bronze & Aluminum Co., The, 6011 Superior Ave., Cleveland, O.

PERFORATED METAL
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

PHENOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

PICKLING COMPOUNDS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Houghton, E. F., & Co., Third, American & Somerset Sts., Philadelphia, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING EQUIPMENT
International Nickel Co., Inc., The, 67 Wall St., New York City.

PICKLING MACHINERY
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

PICKLING TANK LININGS
Ceilcote Co., 750 Rockefeller Bldg., Cleveland, O.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING TANKS—See TANKS (Pickling)

PIERCER POINTS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIG IRON
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson Iron & Steel Co., Jackson, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pickands Mather & Co., Union Commerce Bldg., Cleveland, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

PILING (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 South Dearborn St., Chicago, Ill.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.

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Wood Perserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

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Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.

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SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

PINIONS (Mill)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.

PINS (Taper)
Moltrup Steel Products Co., Beaver Falls, Pa.

PIPE (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Lewin-Mathes Co., St. Louis, Mo.
Shenango-Penn Mold Co., 404 W. Third St., Dover, O.

PIPE (Rubber Lined)
American Hard Rubber Co., 11 Mercer St., New York City.

PIPE (Square and Rectangular)
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE (Steel)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1921 Curtis St., Middletown, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE BALLS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIPE BENDING
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

PIPE CUTTING AND THREADING MACHINERY
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

PIPE FITTINGS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
Oil Well Supply Co., Dallas, Texas.
Worthington Pump & Machinery Corp., Harrison, N. J.

PIPE LINES (Riveted and Welded)
Bethlehem Steel Co., Bethlehem, Pa.

PIPE MILL MACHINERY
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

PIPE STRAIGHTENING MACHINERY
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

PIPING CONTRACTORS
Grinnell Co., Inc., Providence, R. I.
Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.

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American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.

PISTON RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., Box S-8, 4620 Hatfield St., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.

PLANERS (Automatic Controls for)
Detroit Universal Duplicator Co., 218 St. Aubin, Detroit, Mich.

PLANERS AND SHAPERS
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Ohio Machine Tool Co., The, Kenton, O.
Sellers, William, & Co., Inc., 16th & Callowhill Sts., Philadelphia, Pa.

PLANT DISMANTLERS
Hetz Construction Co., Warren, O.

PLATE CASTORS
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.

PLATE LIFTING GRIPS
Downs Crane & Hoist Co., 540 W. Vernon Ave., Los Angeles, Cal.

PLATES (Sheared or Universal) (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 1921 Curtis St., Middletown, O.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Co., The, 33 Pride St., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
*Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PLATES (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLATING EQUIPMENT
Udylite Corp., The 1651 E. Grand Blvd., Detroit, Mich.

PLUGS (Expansion)
Hubbard, M. D., Spring Co., 444 Central Ave., Pontiac, Mich.

PLUGS (Rolling Mill)
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

POLE LINE MATERIAL
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.

POLES (Tubular Steel)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

POTENTIOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

POTS (Case Hardening)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

POTS (Lead)
Pollock, Wm. B. Co., The, 101 Andrews Ave., Youngstown, O.

POTS (Melting)
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.

POWER PLANTS (Diesel, Gas Engine, Steam)
Pritchard, J. F., & Co., Dwight Bldg., Kansas City, Mo.

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Ready-Power Co., The, 3842 Grand River Ave., Detroit, Mich.

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Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRESSED METAL PARTS
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Stanley Works, The, Pressed Metal Div., New Britain, Conn.

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Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.

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Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Bending)
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES, BRIQUETTING (Turnings & Borings)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

PRESSES (Extrusion)
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Hydropress, Inc., 570 Lexington Ave., New York City.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Forging)
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Hydropress, Inc., 570 Lexington Ave., New York City.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Forming and Braking)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Hydraulic)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Denison Engineering Co., The, 1160 Dublin Rd., Columbus, O.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B. Co., Ltd., 195 Duke St., York, Pa.
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydropress, Inc., 570 Lexington Ave., New York City.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

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Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.

PRESSES (Punching, Drawing, Coining, Blanking, etc.)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Scrap Bundling and Baling)
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

PRESSES (Stamping)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSURE VESSELS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Scaife Co., Ann St., Oakmont, Pa.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

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Lewin-Mathes Co., St. Louis, Mo.

PUG MILLS (For Blast Furnaces and Sintering Plants)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

PULLEYS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

PULVERIZERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.
Gruendler Crusher & Pulverizer Co., 2920-28 N. Market St., St. Louis, Mo.

PUMP HOUSES
Dravo Corp. (Contracting Div.), Neville Island, Pittsburgh, Pa.

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Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Hydropress, Inc., 570 Lexington Ave., New York City.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Roper, The Geo. D., Corp., Rockford, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

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Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

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Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
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Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.
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Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Fuel Injection)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

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Brown & Sharpe Mfg. Co., Providence, R. I.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
Hydropress, Inc., 570 Lexington Ave., New York City.
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Racine Tool & Machine Co., Racine, Wis.
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Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Reciprocating)
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Rotary)
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Roper, Thos Geo. D., Corp., Rockford, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Vacuum)
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Vertical Turbine)
Layne & Bowler, Inc., Memphis, Tenn.

PUNCHES (Multiple)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PUNCHING AND SHEARING MACHINERY
Beatty Machine & Mfg. Co., Hammond, Ind.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4461 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RACKS (Steel, for Drums & Barrels)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

RAIL BREAKERS
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

RAILS (New and Relaying)
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

RAILS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

REAMERS
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.

REBUILT EQUIPMENT
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
Galbreath Machinery Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 N. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago, Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O.
West Penn Machinery Co., 1203 House Bldg., Pittsburgh, Pa.

RECEIVERS
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Scaife Co., Ann St., Oakmont, Pa.

RECORDERS (Combustion)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

RECORDERS (Pressure, Speed, Temperature, Time)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4461 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RECTIFIERS (Dry Disc)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

REDUCERS (Speed)—See SPEED REDUCERS

REDUCTION GEARS
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Sturtevant, B. F., Co. Hyde Park, Boston, Mass.

REFRACTORIES (Dolomite)
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

REFRACTORIES (Fire Clay)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Eureka Fire Brick Works, 1100 B. F. Jones Law Bldg., Pittsburgh, Pa.
Globe Brick Co., The, East Liverpool, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.

REFRACTORIES (For High Frequency Furnaces)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

REFRACTORIES (Magnesia)
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

REFRACTORIES (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg., New York City.
Johns-Manville Corp., 22 E. 40th St., New York City.
Quigley Co., 56 W. 45th St., New York City.

REGULATORS (Pressure)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

REGULATORS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4461 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REINFORCEMENT FABRIC (Electric Welded)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.

RESISTORS (Graphite Disc)
Allen-Bradley Co., 1320 So. 2nd St., Milwaukee, Wis.

RHEOSTATS (Plating)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

RINGS (Steel)
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., Box S-8, 4620 Hatfield St., Pittsburgh, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

RINGS (Weldless) (*Also Stainless)
*Midvale Co., The, Nicetown, Philadelphia, Pa.

RIVETERS (Hydraulic—Portable and Stationary)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETERS (Pneumatic)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Chambersburg Engineering Co., Chambersburg, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., Dept. S, 611 N. Mechanic St., Jackson, Mich.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

RIVETS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Hassall, John, Inc., 402 Oakland St., Brooklyn, N. Y.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

RIVETS (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

RODS (Alloy)
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Roebling's, John A., Sons Co., Trenton, N. J.
Seymour Manufacturing Co., The, Seymour, Conn.

RODS (Drill)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.

RODS (Phosphor Bronze)
Seymour Manufacturing Co., The, Seymour, Conn.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.

RODS (Rounds, Flats & Shapes)—Con.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The Youngstown, O.

RODS (Steel and Iron)
Firth-Sterling Steel Co., McKeesport, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLL FORMING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.

ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL EQUIPMENT
Alliance Machine Co., The, Alliance, Ohio.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Hydropress, Inc., 570 Lexington Ave., New York City.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
Streine Tool & Mfg. Co., New Bremen, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

ROLLING MILLS (Consulting, Contracting Engineers)
Hydropress, Inc., 570 Lexington Ave., New York City.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLING MILL MACHINERY (Used)
Foster, Frank B., Oliver Bldg., Pittsburgh, Pa.

ROLLING MILL TABLES
Hydropress, Inc., 570 Lexington Ave., New York City.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLS (Bending and Straightening)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Webb City & Carterville Foundry & Machine Works, Webb City, Mo.

ROLLS (Sand and Chilled)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.-Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Steel and Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. and Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.-Springfield, O.
Pittsburgh Rolls Div., Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Tinning Machine)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

ROOFING AND SIDING
Johns-Manville Corp., 22 E. 40th St., New York City.

ROOFING AND SIDING (Corrugated and Plain)
American Rolling Mill Co., The, 1921 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carey, Philip, Mfg. Co., The, Lockland, Cincinnati, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago,
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
New Jersey Zinc Co., 160 Front St., New York City.
Republic Steel Corp., Dept. ST, Cleveland, O.
Robertson, H. H., Co., Farmers Bank Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

ROOFING (Plastic and Liquid)
Carey, Philip, Mfg. Co., The, Lockland, Cincinnati, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

RUBBER GOODS (Mechanical)
United States Rubber Co., 1230 Sixth Ave., New York City.

RUBBER LINING (Hard and Soft)
American Hard Rubber Co., 11 Mercer St., New York City.

RUST PREVENTIVES
Alrose Chemical Co., 80 Clifford St., Providence, R. I.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Smith Oil & Refining Co., Rockford, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

RUST PROOFING PROCESS
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

SAFETY DEVICES (Electric)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

SALT TABLETS
Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.

SAND CONDITIONING AND PREPARING MACHINERY
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Vapor Blast Mfg. Co., 353 S. 16th St., Milwaukee, Wis.

SAWING MACHINES (Contour)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

SAWING MACHINES (Hack)
Racine Tool & Machine Co., Racine, Wis.

SAWING MACHINES (Hot and Cold)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
Mouch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Racine Tool & Machine Co., Racine, Wis.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SAWS (Band—Metal Cutting)
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Huther Bros. Saw & Mfg. Co., 1290 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

SAWS (Gang)
Wickes Brothers, Saginaw, Mich.

SAWS (Hack)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

SAWS (Hot and Cold)
Huther Bros. Saw & Mfg. Co., 1290 University Ave., Rochester, N. Y.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

SAWS (Inserted Tooth, Cold)
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Huther Bros. Saw & Mfg. Co., 1290 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

SAWS (Metal Cutting)
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SAWS (Segmental)
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

SCAFFOLDING (Tubular)
Dravo Corp. (Machinery Div.) 300 Penn Ave., Pittsburgh, Pa.

SCALES
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Fairbanks, Morse & Co., Dept. E75, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.

SCALES (Dial & Recording)
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.

SCALES (Laboratory)
Fairbanks, Morse & Co., Dept. E75, 600 South Michigan Ave., Chicago, Ill.

SCALES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

SCRAP BALING PRESSES—See BALING PRESSES

SCREENS AND SIEVES
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

SCREW EXTRACTORS
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hindley Mfg. Co., Valley Falls, R. I.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Automatic Machine Co., 2269 Ashland Ave., Cleveland, O.
Cone Automatic Machine Co., Inc., Windsor, Vt.
Greenlee Bros. & Co., Rockford, Ill.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Cap, Set, Safety-Set)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Triplex Screw Co., The, 5317 Grant St., Cleveland, O.

SCREWS (Cold Headed)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

SCREWS (Conveyor)
Lee Spring Co. Inc., 30 Main St., Brooklyn, N. Y.

SCREWS (Hardened Metallic Drive)
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Hardened Self-Tapping)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Machine)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

SCREWS (Machine, Recessed Head)
American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
International Screw Co., Detroit, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

SCREWS (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

SCREWS (Sheet Metal, Recessed Head)
American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Shakeproof Lock Washer Co., Chicago, Ill.

SCREWS (Socket, Cold Forged)
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thread-Cutting)
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thumb)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Wood, Recessed Head)
American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker, Charles, Co., The, Meriden, Conn.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Southington Hdwe. Mfg. Co., Southington, Conn.
Whitney Screw Co., Nashua, N. H.

SEAMLESS STEEL TUBING—See TUBING (Seamless Steel)

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Frantz, S. G., Co., Inc., 221-5 Centre St., New York City.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

SHAFT HANGERS—See HANGERS (Shaft)

SHAFTING
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHAFTING (Flexible)
Walker-Turner Co., Inc., 5063 Berckman St., Plainfield, N. J.

SHAPERS
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Ohio Machine Tool Co., The, Kenton, O.

SHAPERS (Automatic Controls for)
Detroit Universal Duplicator Co., 218 St. Aubin, Detroit, Mich.

SHAPES (Brass, Bronze, Nickel, Silver)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

SHAPES (Steel)—See STEEL (Structural)

SHAPES, SPECIAL (Steel)
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHEAR BLADES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Diston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Heppenstall Co., Box S-8, 4620 Hatfield St., Pittsburgh, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

SHEARS
Beatty Machine & Mfg. Co., Hammond, Ind.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hulden Machine Co., The, Thomaston, Conn.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., 304 8th Ave. So., Minneapolis, Minn.
Streine Tool & Mfg. Co., New Bremen, O.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SHEARS, ROTARY (Slitting, Beveling, Circling, Flanging)
Hydropress, Inc., 570 Lexington Ave., New York City.
Yoder Co., 55 Walworth Ave., Cleveland, O.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEET LIFTERS AND CARRIERS
American MonoRail Co., The, 13107 Athens Ave., Cleveland, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
J-B Engineering Sales Co., 3100 East St., New Haven, Conn.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

SHEET STEEL PILING (New and Used)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.

SHEETS (Acid Resisting)
International Nickel Co., Inc., The, 67 Wall St., New York City.

SHEETS (Black)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-7, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 1921 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Deep Drawing and Stamping)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 1921 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1921 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc. Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Galvanized)
American Rolling Mill Co., The, 1921 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 1921 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Diston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Co., The, 33 Pride St., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Lead Coated)
Continental Steel Corp., Kokomo, Ind.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.

SHEETS (Long Terne)
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Steel Corp., Kokomo, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Nickel Silver)
Seymour Manufacturing Co., The, Seymour, Conn.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Phosphor Bronze)
Seymour Manufacturing Co., The, Seymour, Conn.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing—See ROOFING AND SIDING

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1921 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Massillon, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

SHEETS (Tin)—See TIN PLATE

WHERE-TO-BUY

SHEETS (Tin Mill Black)
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)
American Rolling Mill Co., The, 1921 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHELL BANDS (Rotating)
Lewin-Mathes Co., St. Louis, Mo.

SHELLS (Seamless Drawn)
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

SHIMS (Laminated)
Laminated Shim Co., Inc., Glenbrook, Conn.

SHOVELS (Power)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTER-COMMUNICATION EQUIPMENT
Graybar Electric Co., 420 Lexington Ave., New York City.

SIGNS (Metal)
Webb City & Carterville Foundry & Machine Works, Webb City, Mo.

SILICO-MANGANESE
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SILICON METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

SLITTERS
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Ohio Knife Co., Dremen Ave. & B. & O. R.R., Cincinnati, O.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

SOAKING PITS
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, O.

SOLDER
Kester Solder Co., 4221 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9503 Copeland St., Detroit, Mich.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

SOLVENTS (Degreasing)
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

SPACING TABLES
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Foote, Brad, Gear Works, Cicero Ill.
Grant Gear Works, 2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5113 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A. Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
New Departure Div., General Motors Corp., Bristol, Conn.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.

SPIEGELEISEN
Electro Metallurgical Co., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SPIKES (Screw)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SPINDLE SHAPERS (For Non-Ferrous Metal, Plastics & Wood)
Walker-Turner Co., Inc., 5063 Berckman St., Plainfield, N. J.

SPINDLES (Grinding)
Bryant Chucking Grinder Co., Springfield, Vt.
Ex-Cell-O Corp., 1223 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

SPINDLES (Lathe)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.

SPLICE BARS (Rail)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.

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New Haven, Conn.
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SPLICEBARS (Rail)—Con.

Inland Steel Co.,
38 So. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SPRINGS
(*Also Stainless)

*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
*Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hubbard, M. D., Spring Co., 444 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
*Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.

SPRINGS (Alloy)

Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Coil & Elliptic)

Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Compression)

Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Oil Tempered—Flat)

Barnese, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Torsion)

Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Valve)

Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co. Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINKLERS (Automatic)

Grinnell Co., Inc., Providence, R. I.

SPRUE CUTTERS

Shuster, F. B., Co., The, New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STACKING MACHINES (Hand & Electric)

Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

STAMPINGS

American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Crosby Co., The, 185 Pratt St., Buffalo, N. Y.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Dayton Rogers Co., Dept. C., 2830 13th Ave. So., Minneapolis, Minn.
Eddie Perforating Co., 171 York St., Rochester, N. Y.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Hubbard, M. D., Spring Co., 444 Central Ave., Pontiac, Mich.
Lyon Metal Products, Inc., 7205 Madison Ave., Aurora, Ill.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Scaife Co., Ann St., Oakmont, Pa.
Spriesch Tool & Mfg. Co., 10 Howard St., Buffalo, N. Y.
Stanley Works, The, Bridgeport, Conn.
New Britain, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit, Mich.

STAMPS (Steel)

Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.
Matthews, James H., & Co., 3975 Forbes St., Pittsburgh, Pa.

STAPLES (Wire)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STARTERS (Electric Motor)

Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

STEEL (Alloy)

Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
Heppenstall Co., Box S-8, 4620 Hatfield St., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Washburn Wire Co., Phillipsdale, R. I.

STEEL (Alloy, Cold Finished)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Clad—Corrosion Resisting)
(*Also Stainless)

Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., Dept. 51, Reading, Pa.
*Copperweld Steel Co., Warren, O.
*Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Cold Finished)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Corrosion Resisting)

Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1921 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Biesadt Steel Co., The, 945 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (Die)

Disston Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (Electric)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Copperweld Steel Co., Warren, O.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (High Speed)

Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (High Tensile, Low Alloy)

Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Nitriding)

Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Rustless)—See STEEL (Corrosion Resisting)

STEEL (Screw Stock)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WHERE-TO-BUY

STEEL (Spring)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City—Phillipsdale, R. I.

STEEL (Stainless)—See STEEL (Corrosion Resisting)

STEEL (Strapping)

Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.

STEEL (Strip, Copper Coated)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Thomas Steel Co., The, Warren, O. Rockefeller Bldg., Cleveland, O.

STEEL (Strip, Hot and Cold Rolled)
(*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 1921 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
*Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
*Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
*Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City—Phillipsdale, R. I.
Weirton Steel Co., Weirton, W. Va.

STEEL (Strip, Tin Coated)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Strip, Zinc Coated)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Structural)
(*Also Stainless)

American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd St. and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Clinton Bridge Works, Clinton, Ia.
Columbia Steel Co., San Francisco, Calif.
Duffin Iron Co., 37 W. Van Buren St., Chicago, Ill.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Gage Structural Steel Co., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Lacledes Steel Co., Arcade Bldg., St. Louis, Mo.
Levinson Steel Co., The, 33 Pride St., Pittsburgh, Pa.
Midland Structural Steel Co., Cicero, Ill.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
*Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Tool)

Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 947 E. 67th St., Cleveland, O.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Copperweld Steel Co., Warren, O.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Broach & Mach. Co., 5600 St. Jean, Detroit, Mich.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS

STEEL FABRICATORS—See BRIDGES, BUILDINGS, ETC.

STEEL FLOATING AND TERMINAL EQUIPMENT

Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

STEEL PLATE CONSTRUCTION

American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

WHEELING STEEL

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Ductilloy
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STEEL PLATE CONSTRUCTION—Con.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Graver Tank & Mfg. Co., Inc., 4809-40 Tod Ave., E. Chicago, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

STELLITE
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

STENCILS (Spray and Sand Blast)
Mathews, James H., & Co., 3978 Forbes St., Pittsburgh, Pa.

STICKERS (Identification, Instruction, Rejection)
Avery Adhesives, 451 E. 3rd St., Los Angeles, Cal.

STOKERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

STONES (Honing)
Bay State Abrasive Products Co., Westboro, Mass.

STOPPERS (Cinder Notch)
Bailey, Wm. M. Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

STOPPERS (Rubber)
Rhoades, R. W., Metaline Co., 43 Third St., Long Island City, N. Y.

STORAGE EQUIPMENT
Graver Tank & Mfg. Co., Inc., 4809-40 Tod Ave., E. Chicago, Ind.
Lyon Metal Products, Inc., 7205 Madison Ave., Aurora, Ill.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINERY
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Ltd., 198 Duke St., York, Pa.
Hydropress, Inc., 370 Lexington Ave., New York City.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Shuster, F. B., Co., The, New Haven, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.

SULPHURIC ACID
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
New Jersey Zinc Co., 160 Front St., New York City.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

SURFACE WELDING
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

SWAGING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.

SWITCHES (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept 7-N, East Pittsburgh, Pa.

TACHOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

TANK LININGS
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

TANKS (Gas Auxiliary)
Webb City & Carterville Foundry & Machine Works, Webb City, Mo.

TANKS (Pickling)
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.
United States Rubber Co., 1230 Sixth Ave., New York City.

TANKS (Storage, Pressure, Riveted, Welded)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Graver Tank & Mfg. Co., Inc., 4809-40 Tod Ave., E. Chicago, Ind.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Scaife Co., Ann St., Oakmont, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

TANKS (Wood or Steel, Rubber or Lead Lined)
American Hard Rubber Co., 11 Mercer St., New York City.
United States Rubber Co., 1230 Sixth Ave., New York City.

TAPPING MACHINES
National Automatic Tool Co., The, Richmond, Ind.

TAPS AND DIES
Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich.
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

TERMINALS (Locking)
Thompson-Bremer & Co., 1644 W. Hubbard St., Chicago, Ill.

TERNE PLATE—See TIN PLATE

TESTING MACHINERY (Materials)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

THERMIT WELDING
Metal & Thermit Corp., 120 Broadway, New York City.

THERMOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

THREAD CUTTING TOOLS
Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich.
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

TIE PLATES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

TIN PLATE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TIN PLATE MACHINERY
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Wean Engineering Co., Warren, O.

TITANIUM
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

TONGS (Chain Pipe)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TONGS (Rail Handling)
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.

TOOL BITS (High Speed)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Disston, Henry, & Sons, Inc., 726 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TOOL HOLDERS
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TOOLS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

TOOLS (Precision, Lathe, Metal Cutting, etc.)
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TOOLS (Steel-Cutting)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TOOLS (Tipped, Carbide)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TOOLS (Turning, Boring and Facing)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TORCHES & BURNERS (Acetylene, Blow, Oxy-Acetylene)
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

TOWBOATS
Dravo Corp. (Engin'r'g Works Div.) Neville Island, Pittsburgh, Pa.

TOWERS (Cooling)
Pritchard, J. F., & Co., Dwight Bldg., Kansas City, Mo.

TOWERS (Transmission)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

TOWERS (Tubular Hoisting)
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

TRACK ACCESSORIES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

TRACK BOLTS
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TRAILERS
Easton Car & Construction Co., Easton, Pa.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRAILERS (Arch-Girder)
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRAMRAILS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRANSMISSIONS—VARIABLE SPEED
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

TREADS (Safety)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

TROLLEYS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Ford Chain Block Div., American Chain & Cable Co. Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Corp., Dept. B-7, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCK CRANES
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

TRUCKS AND TRACTORS (Electric Industrial)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Gasoline Diesel)
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

TRUCKS AND TRACTORS (Gasoline Industrial)
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Yard-Man, Inc., 1410 W. Ganson St., Jackson, Mich.

WHERE-TO-BUY

TRUCKS (Dump-Industrial)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.

TRUCKS (Hydraulic Lift)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

TRUCKS (Industrial)
Easton Car & Construction Co., Easton, Pa.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.
Yard-Man, Inc., 1410 W. Ganson St., Jackson, Mich.

TRUCKS (Lift)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TUBE MILL EQUIPMENT
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.

TUBE WELDING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.

TUBES (Boiler)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 947 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBES (Brass, Bronze, Copper, Nickel Silver)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

TUBES (High Carbon)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUBING (Alloy Steel) (*Also Stainless)
*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bissett Steel Co., The, 947 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUBING (Copper, Brass, Aluminum)
American Brass Co., The, Waterbury, Conn.
Lewin-Mathes Co., St. Louis, Mo.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., 404 W. Third St., Dover, O.

TUBING (Flexible Metal)
Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.

TUBING (Monel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.

TUBING (Seamless Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.

TUBING (Seamless Steel)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Columbia Steel Co., San Francisco, Calif.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBING (Square, Rectangular)
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUBING (Welded Steel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Frasse, Peter A., & Co. Inc., 17 Grand St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ohio Seamless Tube Co., Shelby, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBULAR PRODUCTS
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

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Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

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Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
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Lincoln Electric Co., The, Cleveland, O.
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Van Dorn Iron Works, 2685 E. 79th St., Cleveland, O.
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Welding Equipment & Supply Co., 221 Leib St., Detroit, Mich.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., New York City.

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Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
International Nickel Co. Inc., The, 67 Wall Street, New York City.
Lincoln Electric Co., The, Cleveland, O.
McKay Co., The, York, Pa.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.

WELDING RODS (Bronze)
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.

WELDING RODS (Hard Surfacing)
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Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

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Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
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Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.
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Shepard Niles Crane & Hoist Corp., 351 Schuyler Ave., Montour Falls, N. Y.

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Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
*Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE (Annealed, Bright, Galvanized)
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Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Worcester, Mass.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Barb)
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Continental Steel Corp., Kokomo, Ind.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Cold Drawn)
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Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
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WIRE (High Carbon)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
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American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
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Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Spring)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (Stapling)
Continental Steel Corp., Kokomo, Ind.

WIRE (Stainless)
Allegheny Ludlum Steel Corp., Dept. S-220, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE (Welding)—See WELDING RODS OR WIRE

WIRE AND CABLE (Electric)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
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Graybar Electric Co., 420 Lexington Ave., New York City.
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Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
Hubbard, M. D., Spring Co., 444 Central Ave., Pontiac, Mich.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Center St., Corry, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

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Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Shuster, F. B., Co., The, New Haven, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

WIRE NAILS—See NAILS

WIRE PRODUCTS (*Also Stainless)
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Continental Steel Corp., Kokomo, Ind.
Hubbard, M. D., Spring Co., 444 Central Ave., Pontiac, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Hazard Wire Rope Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE ROPE SLINGS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.

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Shuster, F. B., Co., The, New Haven, Conn.

WIRE WINDING MACHINES
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.

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Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

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New Jersey Zinc Co., 160 Front St., New York City.

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Form No. WSS-BP-5

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Steel	Silicon	Molybdenum	Chromium	Vanadium	Tungsten	Manganese
A		.20				1.60
B				.20	1.25	
C			.50		.50	1.20
D			.70		.50	1.00
E			.50	.20	.50	1.20
F			.50	.25	.45/.75	1.20
G						1.50/1.80
H			.50	.15	.30	1.30
I			.70	.11	.50	1.30
J			1.60		.45	
K			1.20	.20		.90
L			.27	.25		1.70
M			.40	.10		1.30
N			.60		.40	1.20
O			.50		.50	1.05
P			.50		.50	1.15
Q			.50	.25		1.25
R			.50		.50	1.20
S			.20			1.65
T			.50		.50	1.20
Graph-Mo	.75/.85	.25				

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STEEL
SECTION TWO
JULY 6, 1942

PRIORITIES

ALLOCATIONS

PRICES

REVISED AS OF JULY 1, 1942

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—The Editors

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Stoves (domestic)	No. 64
Sugar	Nos. 16, 60
Summer Seasonal Commodities	No. 142
Tanks (domestic oil storage)	No. 96
Tea	No. 91
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Tires and tubes	Nos. 63, 107, 119, 143
Tires (retreaded, recapped)	No. 66
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Vacuum cleaners (resale)	No. 111
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PRIORITIES
ALLOCATIONS

■ Digest of Priority, Allocation, and Limitation Orders. Issued by the War Production Board, New Social Security Building, Washington, D. C., Telephone Republic 7500. On specific problems local Priorities Field Offices listed on Page 38 of this section should be consulted.

"M" ORDERS

M-1-f: Aluminum, effective Feb. 17, 1942, replacing M-1, and M-1-a. Provides for complete allocation control of virgin and secondary metal. Each producer, approved smelter and fabricator must file, on PD-26a, a shipping schedule for each month by 15th of preceding month. Customers must detail monthly requirements by 5th of preceding month. Aluminum for permitted civilian uses requires rating certificate issued after Oct. 31, 1941. Civilian users must report inventories on PD-40a by April 20, 1942, quarterly thereafter. Only approved smelters and producers may acquire aluminum requiring smelting or melting before being used. Stocks in excess of immediate needs must be sold either to a buyer to fill rated orders for essential items, or as scrap. Order does not apply to products used by ultimate consumer or to finished products moving to ultimate consumer, or to scrap.

M-1-d: Aluminum Scrap, effective Jan. 7, 1942, revoking P-12 and M-1-c. Latter, effective June 10, 1941, revoked M-1-b which became effective April 11, 1941. Prohibits use of scrap, except home scrap, without authority of Dir. of Indus. Oper. Does not apply to virgin aluminum producers or approved smelters. Beginning March 1, 1942, every plant generating 1000 pounds or more of scrap per month must segregate scrap at the machine. All 17S, 24S and 52S alloy scrap in solid form must be sold to Aluminum Co. of America or Reynolds Metals Co., all other segregated scrap to these companies, approved smelters or dealers. Identity of segregated scrap must be certified to by seller. Order affects only scrap containing 15% or more aluminum by weight.

M-1-e: Aluminum, effective Jan. 23, 1942. Prohibits aluminum use except on war contracts and for making following: Anhydrous aluminum chloride for manufacture of dyes for war textiles, high octane gasoline, tear gas, nylon or pharmaceuticals; deoxidizer or alloying agent in steelmaking when consumption not over 0.03 per cent by weight of carbon steel or 0.1 per cent of alloy or deep drawing steel produced; chemical processing equipment where other material impracticable; commercial aircraft with A-10 rating or higher; containers for intravenous solutions and blood; radio condensers for replacement; match plates, patterns and snap flasks used to fill orders with rating higher than A-2; orthopedic equipment requiring light weight; pistons for engines of heavy trucks, heavy duty tractors, diesel engines and engines of portable fire-fighting equipment; repair and maintenance parts for mechanical or electrical equipment; welding rods; X-ray tube housings; thermit reaction; zinc base alloy, limited to 2 percent of weight of alloy produced; other alloys, limited to 12 per cent. Aluminum authorized by Priorities Director between Oct. 31, 1941 and Jan. 23, 1942 may be used for purpose specified.

M-1-g: Aluminum Pigment, Paint, effective March 10, 1942. Prohibits manufacture or sale, except retail, unless Director of Industry Operations approves application made on PD-312. Pigment manufacturers and paint formulators and jobbers report stocks to WPB by 15th of April and each succeeding month.

M-2: Magnesium, effective March 24, 1941: M-2-a, supplementary order, effective March 24, 1941; M-2-b, supplementary order, effective Nov. 14, 1941, revokes M-2.
Applies to all materials and products, including scrap, principal ingredient of which is magnesium. Deliveries are subject to monthly allocation by Dir. of Indus. Oper. Magnesium products may be used only on orders carrying a rating of A-1-j or higher. Alloying any material with magnesium without approval of Director of Industry Operations prohibited. All material, in whatever form, not being used to fill orders with ratings of A-1-j or higher, must be disposed of to a producer or approved smelter.
Producers, fabricators, secondary smelters must file PD-26-m monthly by the 20th with Aluminum and Magnesium branch, giving shipping schedules. Users report inventories by the 15th on PD-40-m; stocks, receipts, disposition reported on PD-173 for magnesium and products, on PD-174 for powder metal.

M-6: Nickel, effective May 15, 1941; Revoked by General Preference Order M-6-a, effective Sept. 30, 1941. Deliveries to be made by producers and distributors only as authorized by Director of Industry Operations, except to Metals Reserve Co. Amendment, March 30, 1942, extends order to cover nickel salts, oxides, carbonates and solutions, concentrates and residues from which nickel commercially recoverable.

M-6-b: Nickel, effective Jan. 20, 1942. Bans use for certain specified purposes after April 1. Affected uses, except where necessary for operational purposes: Transportation equipment; plating; containers of all types; fire-fighting and lighting equipment; building supplies; hardware and ornamental metal work; plumbing, heating and

air conditioning supplies; clothing accessories, jewelry, toilet articles, accessories, souvenirs, novelties, games, toys, art objects and musical instruments; branding, marking and labeling devices; decorative uses of all kinds; photographic and art equipment and supplies; sporting goods and pleasure boat fittings; saddlery and harness hardware and fittings. Affects domestic and industrial appliances, except heating elements for replacement purposes or in electric ranges, portable heaters and storage type water heaters.

M-6-c: Nickel Scrap, effective April 23, 1942. Requires segregation by all persons handling nickel scrap. Dealers may make deliveries only to melters being allocated nickel and for use in products for which allocation made, or to melters with orders requiring nickel and rated higher than A-2. Persons generating scrap containing more than 500 lbs. of contained nickel per month or who have that amount on hand at end of month, or who have on hand at end of month more than 30 days' accumulation of scrap they produced (if nickel content more than 100 lbs.) required to report by 15th of each month. Use PD-149, 150, 151 for iron and steel scrap, PD-394 for other nickel scrap and secondary nickel.

Amendment, June 19, 1942, requires segregation of ferrous nickel scrap in same manner as provided in M-24-c. Order provisions cover scrap containing 1% or more nickel. Dealers prohibited from melting scrap without authorization of Director of Industry Operations.

M-8: Cork, effective May 31, 1941. Expired Sept. 30, 1941. M-8-a, effective Oct. 1, 1941.

M-9: Copper, effective May 29, 1941; superseded by **M-9-a**, effective Aug. 2, 1941; **M-9-a** amended Jan. 7, Feb. 6, 25, May 7, 1942. Deliveries by refiners must be authorized by Director of Industry Operations. Persons may obtain copper from dealers without allocation certificates but not from both dealers and refiners. Details regarding toll agreements must be approved by Director of Indus. Oper. Order prohibits sale of copper and its products by mills, warehouses or foundries except on A-1-k or higher rating. Fabricators file PD-59 as revised to apply for monthly requirements for domestic consumption and PD-60 as revised to report needs for various classifications. Refiners file PD-61 monthly, listing production and shipments of duty free copper.

PD-76 is copper allocation certificate; PD-121-a is smelters' scrap inventory, PD-121-b foundries' scrap inventory; PD-123 covers December requirements, PD-123-a January requirements, PD-123-b monthly deliveries.

M-9-b: Copper and Copper-Base Alloy Scrap and copper base alloy brass and bronze) ingots, effective Sept. 30, 1941, amended Dec. 31, 1941, March 31, May 9, 1942. "Copper base alloy" means any alloy analyzing 40% or more copper by weight. "Ingot" means an ingot or other shape for remelting. "Brass mill scrap" means scrap which is by-product of industrial fabrication of products produced by brass mills.

Brass mill scrap may be delivered only to a scrap dealer or brass mill. Dealers may deliver only to another dealer or brass mill. No. 1 or 2 copper and scrap other than brass mill may be delivered only to a dealer or person specifically authorized by Director of Industry Operations. A scrap dealer may not accept additional scrap if inventory exceeds amount sold during the preceding 60 days. Ingots may be delivered only on specific authorization. Fabricators, except railroads and utilities, may not use or remelt scrap produced in their own operations, or dispose of it except by sale, without permission. No fabricator may keep more than 30-days' scrap accumulation, unless total is less than 5 tons. No copper or brass mill scrap may be delivered under future conversion or toll agreements, unless approved by Dir. of Indus. Oper. Obsolete scrap wire or cable used by public utility in own operations must be over 5 ft.; monthly use limited to 5 tons.

All melters or processors of scrap other than brass mills must file PD-121 with WPB by 15th each month. Dealers file PD-249 by the 10th with Bureau of Mines, College Park, Md. Any person other than a foundry may file PD-130 with WPB for permission to melt or process scrap. Industrial producers of more than 2000 lbs. monthly file PD-226. Foundries using scrap or ingots use PD-59 revised for requirements after Aug. 1, 1942 under ruling issued June 23, 1942. Temporary form PD-518 covers requirements to Aug. 1.

M-9-c: Use of copper or copper base alloy in manufacture of any one of more than 100 civilian articles prohibited after Jan. 1, 1942. Amendment, Dec. 8, 1941, exempts certain industrial items. PD-167 filed to obtain relief under hardship clause, PD-172 for permission to use material in stock.

Amendment, Feb. 28, 1942, permits copper use for essential operating, maintenance and repair parts for railroad cars, locomotives, equipment. Amendment, April 9, 1942, freezes stocks of copper screenings. Amendment, May 7, 1942, adds additional items to prohibited list.

M-9-c-1: Copper in Shoes, effective Jan. 23, 1942. Effective March 31, 1942, use of copper in making shoe findings (eyelets, hooks, etc.) prohibited, except for material in stock March 31 when no steel or non-metallic findings available.

M-9-c-2: Copper in Jewelry, effective April 4, 1942. Prohibits copper use in making jewelry after May 15, 1942.

M-9-c-3: Copper in Printing, March 28, 1942. Use of bronze powder, ink, paste and leaf by printing and publishing industry banned after May 31, 1942. Powder in hands of other than manufacturers may be used until Dec. 15.

M-10: Polyvinyl Chloride, effective June 9, 1941. Use Forms PD-7, PD-36. Effective Jan. 1, 1942, all deliveries subject to authorization by Director of Indus. Oper.

M-11: Zinc, effective July 11, 1941. Amended, effective June 1, 1942, setting up complete allocation. Consumers apply to Director of Industry Operations monthly on PD-94a for allocation certificate, forwarding certificate to producer to receive shipment. Dealers apply for allocation certificate on PD-450. Applications due by 15th each month. Certificates not required to buy from dealers. M-11-a, effective June 1, 1942, requires zinc oxide and dust producers to set aside quantities monthly for pool, as ordered by Director of Industry Operations. Buyers file PD-62 by 15th to request allocation following month.

M-13: Synthetic Rubber (includes Neoprene), effective June 9, 1941. Consumers file Forms PD-7, PD-36 to request monthly requirements. Producers report to Synthetic Rubber Section WPB on PD-33, detailing stocks, production orders. Effective Jan. 1, 1942, all deliveries subject to authorization by Director of Industry Operations.

M-14: Tungsten High-Speed Tool Steel, effective June 11, 1941; amended, effective Dec. 3, 1941. No orders to be placed or filled for tungsten-type steel if molybdenum type will fill buyer's requirements. Total deliveries of tungsten-type steel shall not exceed by weight one-third of deliveries of molybdenum-type steel in the same quarter. Producers must report quarterly to Iron and Steel Branch, WPB, on PD-101.

M-15: Rubber, effective June 20, 1941. Use Form PD-49. **M-15-a:** Supplementary Order, effective June 27, 1941, expired July 31, 1941. M-15-b, effective Dec. 11, 1941, restricts rubber use to orders with rating of A-3 or higher or for certain specifically listed purposes. M-15-c, effective Dec. 27, 1941, restricts sales of new tires and tubes, subject to Rationing Regulation No. 1. Dealers report tire, tube stocks monthly on PD-216. Amendment to M-15-b, Mar. 1, 1942, restricts rubber use in making certain industrial products to various percentages of average consumption in year ended March 31, 1941. M-15-b-1, June 12, requires use of more reclaimed rubber in industrial tires.

M-17: Pig Iron, Aug. 1, 1941; amended Oct. 14, 1941, April 1, 1942. Customers submit monthly requirements by filing with producers by the 5th of the month on Form PD-69. By the 5th of each month customers must file Form PD-70 with Iron and Steel Branch, WPB, showing stocks, consumption and requirements for following month. Producers must file by the 12th PD-71, PD-71d, covering proposed shipments for coming month. Such shipments may not be made until approved by Dir. of Indus. Oper. All tonnage allocated, including steelmaking iron.

M-18: Chromium, effective July 7, 1941; amended, effective Aug. 22, 1941; revoked by M-18-a, effective Nov. 29, 1941. M-18-a amended Jan. 13, Feb. 4, 1942. Applies to all processors, dealers, producers and purchasers. Includes ores or concentrates, ferrochromium and combinations with other elements, chromium refractory material and scrap or secondary material. All melting and deliveries must be authorized by Director of Industry Operations. Monthly use of chromium oxide for manufacture of chromium chemicals from ores or concentrates must not exceed monthly average consumption during period July 1, 1940, through June 30, 1941. Monthly requests for chromium, ferrochromium and other combinations used in making steel or for other metallurgical purposes must be made to sellers by the 20th of each month on PD-53a or 53b, with copy to WPB. PD-54 is request for chromium chemicals.

M-18-b: Chromium, effective March 26, amended June 29, 1942. Use of chromium in manufacture of roofing materials, ceramics, soap and glass and use of chromium pigment restricted to 100% of amount used in year ended June 30, 1941. Manufacture of chromic acid restricted to 80% of base period rate; chromium use for leather tanning restricted to 100%; all other uses as chemical restricted to 100% of base period.

M-19: Chlorine, effective July 26, 1941. Amendment, issued Dec. 20, provides for direct allocation after Feb. 1, 1942. PD-190 must accompany all orders.

M-20: Calcium-Silicon, effective, July 29, 1941; revoked by M-20-a, effective, Nov. 29, 1941. All shipments are under

direct allocation by Dir. of Indus. Oper. Customers must file Form PD-72 by the 25th with suppliers to obtain shipment the following month, also filing one copy with WPB.

M-21: Iron and Steel, Aug. 9, 1941; amended Sept. 9, 1941, April 21, 29, 1942. Applies to cast and rolled iron and steel. Deliveries after May 15, 1942, limited to orders rated A-10 or higher, except warehouse shipments of carbon steel for maintenance and repair, and nails, bale ties and small welded pipe. Orders are to be filled according to preference ratings. Accumulation of inventories beyond buyers' current needs is prohibited. Form PD-73 abolished on orders shipped after June 1, 1942, after which buyers must certify on each order material is to be used for Army, Navy, Maritime Commission, Defense Projects, Lend-Lease, Other Export, Railroad, Warehouse, or All Other purpose.

Material obtained under allocation or preference rating must be used for purpose specified. Dir. of Indus. Oper. may direct producers to make deliveries for particular purposes without regard to preference ratings. Producers must file Form PD-138 by the 15th each month with Bureau of Census to report shipments, PD-139 by the 10th to report requests for shipment. PD-169 monthly plate report.

M-21-a: Alloy Iron, Alloy Steel, Wrought Iron, effective Sept. 16, 1941, revoking M-5, M-5-a, M-5-b, as amended. Amendments effective Nov. 25, Dec. 20, 1941. All provisions of Order M-21 are part of this order. Dir. of Indus. Oper. may specify quantities and forms of alloys in alloy iron or steel. Deliveries under toll agreements must be approved by the Director. Alloy iron or steel is defined as containing manganese in excess of 1.65%, or silicon in excess of 0.60% (5% for iron), or copper in excess of 0.60% or any other element added to obtain a desired alloying effect. Amendment, June 1, 1942, restricts filling of orders to A-1-k or higher ratings, except for certain National Emergency and other low alloy steels, which take A-3 or higher ratings. Buyers must describe end-use of material ordered. Producers melting 4000 or more lbs. of chromium and 500 pounds of nickel monthly file PD-391, 391-a and 440 with WPB monthly.

M-21-b: Steel Warehouses, effective Sept. 3, 1941. Amended, Jan. 1, Feb. 28, May 4, 25. Warehouse quotas of Schedule A products are limited by a quota established by the Director of Industry Operations upon application on PD-83-a. Preference rating is A-1-k. Quotas for merchant products based on receipts from producers in corresponding 1940 quarter or on one-fourth total 1940 receipts. Preference rating is A-3. Warehouses must file PD-83 (Revised) by the 15th of each month with Bureau of the Census, detailing stock additions, shipments and inventories. Warehouses are forbidden to sell steel except on orders rated A-10 or better (higher than A-2 for heavy plates), except a limited amount of carbon steel for maintenance and repair, and nails, bale ties, fence, barbed wire, corrugated roofing and siding and small welded pipe. After June 30, stocks at the end of any quarter may not exceed 1½ times (two times for tool steel bars) quarterly quota. Rating extensions limited by shipments from stocks.

Form PD-83-b is preference rating certificate; PD-83-c is producer's statement on consigned sales, stocks; PD-83-d is classification instruction for PD-83; PD-83-e requests change in producers supplying products; PD-83-f covers producer's shipments of Schedule B products; PD-83-g is application for higher than A-1-k or A-3 ratings.

M-21-c: Steel Plates, issued Feb. 16, 1942. Includes carbon and alloy steel plates ¼-inch or thicker, over 48 inches wide; ⅛-inch or thicker, over 6 inches wide; 7.65 pounds per square foot or heavier, over 48 inches wide; 10.2 pounds per square foot or heavier, over 6 inches wide. Stainless steel plate sizes are ⅛-inch or thicker, 10 inches and wider: 7.65 pounds per square foot or heavier, 10 inches and wider. Customers must file PD-298 with producers by 1st of month preceding month in which shipments required. Two copies are filed with producer, one copy with Iron & Steel Branch, Plate & Shape Unit, WPB. Consumers must file PD-299 by 7th of the month, listing consumption, inventories and receipts for preceding month and estimated requirements for two months following. Producers report to WPB daily, weekly and monthly by wire on plate shipments, and monthly on PD-169 and 169-a on schedules for following month. Only plate orders carrying A-10 or higher rating or specifically allocated by Director of Industry Operations may be requested, scheduled or delivered.

M-21-d: High Chromium Steel, Jan. 6, amended March 27, 1942. Bans delivery or use of corrosion or heat-resistant alloy iron or steel containing 4 per cent or more of chromium without A-1-k rating or higher. Does not apply to fully fabricated articles. Persons other than warehouses possessing this material required to file PD-221 with Iron & Steel Branch, WPB, by Feb. 1, 1942.

M-21-e: Tin Plate, Terne Plate, Long Ternes, effective Feb. 3, amended May 16, 1942. Limits use for cans and closures to extent authorized by M-81 and M-104; for baking pans for institutions and commercial bakers, hot dipped tin plate up to 1.25 lbs. per base box and electrolytic plate up to .50 lbs.; for dairy equipment, hot dipped plate up to 3.30 lbs.; for cheese vats, dipped plate up to 11 lbs. per box; for gas meters, dipped plate up to 3.3 lbs., electrolytic up to .50, short ternes up to 1.30, long ternes up to 4 lbs.; for oil lanterns, short ternes up to 1.3, long ternes to 4; for textile spinning cylinders and card screens, dipped plate up to 1.25 lbs. Persons with frozen stocks required to list holdings with WPB for purchase and distribution.

M-21-f: Shot and Bullet Core Steel, effective Feb. 17, 1942. Applies to steel for 20, 37, 40, 57 and 75 mm. and 3-inch armor piercing and semi-armor piercing shot, and .30 and .50 caliber bullet cores. Starting March 1 all deliveries must be made on allocation order. Producers report weekly to WPB and Army and Navy Munitions Board on PD-307. Buyers report monthly on PD-308. Amendment, May 21, adds steel for 90 mm. armor-piercing shot.

M-22: Silk, effective July 26, 1941. Use Forms PD-77, 78, 78-a,

M-23: Vanadium, effective Aug. 14, 1941. Revoked by M-23-a, Dec. 20, 1941 amended June 23, 1942. Includes ores of concentrates, ferrovanadium and combinations with other elements, chemical combinations, and scrap or secondary material containing commercially recoverable vanadium, as well as pure vanadium. Establishes full allocation, requiring deliveries to be authorized by Dir. of Indus. Oper. Processing permitted only under provision of M-21-a. Buyers must file Forms PD-209-A and 209-B with Vanadium Branch, WPB by 20th of month Buyers also file 209-B with suppliers. Monthly deliveries up to 10 pounds contained vanadium do not require the reports.

M-24: Scrap Iron and Steel, effective Oct. 11, 1941. Defense orders must be accepted and given preferential treatment. On or before 15th of each month, producers who during preceding month produced 50 gross tons or more of scrap must report to Bureau of Mines, Pittsburgh, on Form PD-149, listing scrap inventory, production and sales. Dealers and brokers must file Form PD-151 by same date showing scrap inventory, purchases and sales. Consumers must report monthly on Form PD-150 their inventory, production, receipts and consumption. Director of Indus. Oper. has broad powers to control deliveries of scrap at his discretion.

M-24-a, March 24, 1942, prohibits sale or shipment of tinned scrap in any of 27 specified California counties, except to broker or dealer, or to detinning or copper precipitation plant there. Detinned scrap must go to copper precipitation plants. M-24-b, April 22, 1942, requires segregation of tin plate scrap for delivery to steel mills, prohibits mixture of such material with other scrap in bundle or car. Restrictions on consumers' inventories lifted May 23, 1942.

M-24-c: Alloy Scrap Segregation, effective June 17, 1942. Sets up 18 classifications of alloy steels. Requires producers of 10 tons or more of scrap of these types monthly to segregate accumulations. Prohibits mingling of segregated scrap except in melting process.

M-25: Formaldehyde, Paraformaldehyde, Hexamethylenetetramine and Synthetic Resins, effective Aug. 23, 1941.

M-26: Silk Waste, effective Aug. 8, 1941.

M-27: Phenols, effective Aug. 30, 1941. Amended Nov. 10, 1941, to provide complete allocation. Use Forms PD-1 A, 178-a, b; 180.

M-28: Chlorinated Hydrocarbon Refrigerants, effective Aug. 22, 1941. Use PD-161, 2, 3, 4.

M-29: Tungsten, effective Aug. 31, 1941, revoking M-3, M-3-a. Includes secondary material containing commercially recoverable tungsten. Buyers of 100 pounds or more of contained tungsten monthly file request for material with WPB by 10th of month on PD-9, filing one copy with supplier. Authority of Director of Industry Operations required to deliver ferrotungsten, metal powder and chemicals going into metal powder. Chemical tungsten processors, other than of forms going into tungsten powder, are generally limited in processing or purchasing to 90% of rate for 12 months ended June 20, 1941. M-29-b, effective Feb. 14, 1942, prohibits use of tungsten in grinding wheels, gauges, and as coloring material for rubber, linoleum, paper or similar materials after May 1, 1942. Other users must limit consumption after April 1 to 17½% of use in base year. Exemptions: Government contracts; orders with A-1-j rating or higher; safety requirements; alloy steels; welding rods; laboratory, electrical, radio, X-ray equipment; electronic relays and electric lighting uses.

M-30: Ethyl Alcohol and Related Compounds, effective Aug. 28, 1941.

M-31: Methyl Alcohol, effective Aug. 28, 1941.

M-34: Toluene, effective Aug. 28, 1941. Placed under complete allocation, effective Feb. 1, 1942. To request deliveries, buyers file PD-223 with orders by 10th of month. Producers file PD-224 and copy of each PD-223 with Chemicals Branch, WPB. Amendment May 22, 1942, requires maximum production of toluene by oil processors and coke oven operators.

M-36: Manila Fiber and Manila Cordage, effective Aug. 29, 1941. Amendment, Oct. 14, 1941. Use Forms PD-128, 129. Amendment, effective Dec. 19, 1941, makes deliveries of fiber subject to authorization by Dir. of Indus. Oper. Limits deliveries of cordage to orders with rating certificate of A-1-j or better, or for ships, oil or gas well drilling. Use Form PD-128.

M-37, a, b: Rayon Yarn, effective Sept. 13, 1941. Use forms PD-112, 113. PD-102, a is allocation request, PD-106 is actual allocation. M-37-c superseded 37-a, April 1, 1942.

M-38: Lead, effective Oct. 4, 1941. Refiners and dealers must file Form PD-124 with Dir. of Indus. Oper. by the 20th of each month, detailing proposed shipments for the following month. Each refiner must set aside in May a pool tonnage equal to 15% of its March production, as fixed by Dir. of Indus. Oper., to be allocated directly for emergency needs. Refiners must ship balance according to preference ratings. Lead released by Metals Reserve Co. is allocated by Dir. of Indus. Oper. Consumers must file Form PD-66 by the 15th of each month with WPB Lead Commodity Branch, applying for allocation in the following month and detailing inventories. PD-66-a covers monthly allocations.

M-38-c: Lead, effective Jan. 10, 1942. Bans lead use for following, April 1: Automobile body solder; ballast or keels for pleasure boats; blocks for cutting leather; building supplies; caskets and casket hardware; foil; ornamental glass; regalia; badges and emblems; statuary and art goods; tennis court markers; toys, weights for bats, clocks, decoys, dresses, golf clubs, jockey saddles. Exempted are uses called for by safety regulations, government contracts, orders of A-1-j or higher and in plants where corrosion makes lead imperative, building supplies on critical list for defense housing. Use PD-234 to seek exemptions. Amendment, April 6, 1942, prohibits use in buttons, costume jewelry, novelties, trophies. Lead foil for cigarette packaging banned May 1, 1942. Permits manufacture of lead rods used in stained glass windows and, when other material impractical, making of foil for condensers, electrotyping and moulding lead, and dental X-ray equipment and supplies.

M-39: Cobalt, effective Nov. 3, 1941, amended Feb. 7, 1942. Includes cobalt in all forms. All deliveries must be authorized by Director of Industry Operations. Buyers of more than 50 lbs. of contained cobalt in one month must file with supplier and WPB Forms PD-152 and PD-153 by 20th of month to receive delivery following month. **M-39-b,** effective Feb. 7, 1942, prohibits cobalt use in all pigments after May 1. For other purposes quarterly consumption after April 1 cut to 35% of use first six months of 1941. Specified exceptions include government orders, orders with A-1-j or higher rating, ground coat frit for enameled steel.

M-40: Sperm Oil, effective Oct. 16, 1941. Placed under complete allocation May 16, 1942. Banned in making lubricating or cutting oils or compounds, if sulphur content below 10%.

M-41: Chlorinated solvents, placed under full priority, Oct. 15, 1941. Use form PD-127.

M-43: Tin, effective Dec. 18, 1941. All shipments and uses must be authorized by Director of Indus. Oper. Distributor may deliver less than 5-ton lots to regular customers, subject to Priorities Regulation No. 1. Imports must be sold to Metals Reserve Co. Use PD-213 to apply for allocation. Amendment, effective Jan. 14, 1942, cuts permissable amount sold without authorization by Dir. Indus. Oper. from 5 tons to 3, limits total monthly receipts from all suppliers to 5 tons. Amendment, April 10, 1942, prohibits sales, except by retailers, of solder containing more than 16% tin, any tin-bearing babbitt metal or tin oxide. Exceptions: Orders rated A-9 or higher; orders rated A-10 or higher if for equipment maintenance or repair; for making tin cans under Order M-81.

M-43-a: Tin, effective Dec. 31, 1941, amended Feb. 14, March 17, June 1, 1942. Use in making following items banned April 1, 1942: advertising specialties, art objects; auto body solder, musical instruments, beverage dispensers, britannia metal, broom wire, buckles, buttons, chimes and bells, emblems and insignia, eyelets, fasteners, foil (except for condensers, electrotyping and moulding lead in printing trades, X-ray supplies and dental use), galvanizing, household furnishings and equipment, jewelry, kitchen equipment, novelties, souvenirs, trophies, ornaments, pewter, decorative plating and powder, refrigerator trays and shelves, seals and labels (except meat seals), slot and vending machines, pin-ball games, coated paper, oxide in enamelware as pacifier, toys. Use PD-229 to appeal for exemptions. For items not specified tin use cut 50% from base period rate until April 1, 60% until June 30, 70% thereafter. Substitutes or secondary tin must be used whenever possible.
Tin content of lead base alloy other than solder limited to 12%; solder to 38% until May 1, 30% thereafter; collapsible tubes to 7½%; terne for terne plate to 15%; long ternes to 10%. Above limitations do not apply, when substitutes impracticable, if products being made are rated A-1-k or higher; bearing metal A-3 or higher; tin or terne plate made under M-21-c. Virgin tin banned for making or treating type metal. Manufacturing jewelers prohibited Feb. 14 from processing in any way the tin in their possession; revised March 17 to permit use before May 1 of 3% of amount used in year 1941. National Lead Co. designated to purchase excess stocks of jewelers' tin-bearing metal stocks at prices fixed by WPB. Tin oxide delivery or use banned July 1, 1942, except on orders rated A-1-k or higher.
Amendment, April 4, 1942, permits use of enough solder to manufacture cans permitted by Order M-81. Auto body solder defined to include tin-bearing material used as filler or smoother on autos or trucks. Amendment, April 10, 1942, permits tin use for combat end products.

M-44: Titanium Pigments, effective Dec. 1, 1941, amended Jan. 7, 1942. Applies to distribution of titanium dioxide for use as pigment. Sets up defense pool of 20% of daily production to fill mandatory purchase orders. Remaining production is to be prorated on an equitable basis to all customers. Use Forms PD-145, 146. Amendment, Feb. 1, 1942, increases pool percentage to 25%.

M-45: Sheet steel inventory for **Steel Drums,** effective Nov. 17, 1941, amended Dec. 31, 1941. Directs reservation by Dir. of Indus. Oper. of designated quantity of hot rolled sheets in drum makers' possession or ownership, for subsequent use in making drums for overseas shipment of petroleum and other products. Also applies to sheets obtained under P-76. Use PD-154-a to order reservation; PD-155a is authorization to process steel. Amendment, May 25, 1942, expands allotments to include cold rolled sheets.

M-46: Chlorinated Rubber, effective Nov. 1, 1941. Fabricators file PD-143 to list needs, PD-144 to report receipts, use and inventory. Amendment, Feb. 23, 1942, restricts uses generally to military needs. Stocks for other uses must be reported to WPB.

M-47: Burlap, effective Dec. 21, 1941, placed under complete allocation.

M-49: Iridium, effective Dec. 12, 1941. Forbids use of iridium and alloys in jewelry manufacture. PD-211 used to report monthly sales or transfer of metal.

M-50: Jewel Bearings, issued Jan. 14, 1942. Provides for complete allocation, starting March 1, 1942. Until then all sales not specifically authorized by Dir. Indus. Oper. are prohibited, except for delivery on orders of A-1-j or higher. Use PD-235, 236. Amendment Feb. 28, 1942, prohibits use of large bearings except on A-9 or better orders, unless units in place Jan. 15, 1942.

M-51: Pigs' and Hogs' Bristles, effective Dec. 13, 1941. M-51-a, effective Jan. 7, 1942, requires all persons having title to bristles to report on PD-217 to Bureau of Census by Jan. 15, 1942.

M-52: Sulphite Pulp, effective Jan. 9, 1942. Directs distribution and conserves supply.

M-53: Printing Ink, effective March 30, amended June 29, 1942. Limits use of following to 70% of 1941 rate in making printing inks: Molybdate orange, chrome green, orange mineral and organic pigments. Use of chrome pigments and iron blue limited to 100% of 1941 rate.

M-54: Molasses, effective Dec. 31, 1941. Restricts monthly deliveries to various types of purchasers up to 50 per cent of monthly average receipts in 12 months ended June 30, 1941. Deliveries for foundry purposes limited to 110 per cent of base period date.

M-55: Sugar, effective Dec. 22, 1941. Use Form PD-206.

M-56: Natural Resins, effective April 16, 1942.

M-57: Tung Oil, effective Jan. 8, 1942. Sales limited to A-2 orders or better, with following exceptions: For food can linings and outside can coatings when necessary; for Defense Supplies Corp.; and to comply with safety and health regulations. Amendment, April 15, 1942, extends restrictions to oiticica oil.

M-58: Glycerine, March 30, 1942. Deliveries of more than 50 pounds monthly placed under allocation, effective May 1, except for war orders and health supplies. Use for making anti-freeze banned, other uses limited to 70% of average 1940 rate. Users file PD-362 monthly with suppliers and WPB. Refiners and producers report on PD-363.

M-59: Palm Oil, effective March 20, 1942. Restricts use to manufacture of tin plate, terne plate, long ternes and steel sheets and strip; to manufacturing processes in which glycerine produced, provided remaining glycerine in product not over 1½%.

M-60: High Lauric Acid Oils, effective March 20, 1942. Prohibit use of oils which do not produce glycerine or in which amount of glycerine remaining exceeds 1½% on anhydrous soap basis.

M-61: Madagascar Flake Graphite, effective Feb. 17, 1942. Limits use to manufacture of crucibles, subject to authorization by Director of Industry Operations. Producers request authorization monthly on PD-303A and PD-303B. Buyers seeking any article containing this material apply on PD-1A.

M-62: Sodium Nitrate, effective Jan. 15, 1942. Full allocation starts Feb. 1, 1942. Producers and distributors who have not received specific directions by first of month covering deliveries may make deliveries without limitation, subject to provisions of Priorities Regulation No. 1. Use PD-238 to report receipts.

M-63: Imports of Strategic Materials, effective Dec. 28, 1941. Covers antimony, cadmium, chromium, copper, graphite, hyanite, lead, mercury, rutile, tungsten, vanadium, zinc, zirconium. Imports to be handled only by Metals Reserve Co. or other governmental agency, unless permission granted by Dir. of Indus. Oper. upon submission of Form PD-222a. Amendment, March 14, 1942, removes restrictions on imports of cadmium; zinc, lead and copper ores and concentrates. Amendment, April 9, 1942, adds locumbite and columbium ore, tantalum ore, mercury-bearing ores and concentrates, graphite, cotton linters of chemical grades and various nuts and nut oils. Amendment, May 4, 1942, adds beryllium products. Amendment, June 1, adds iron and steel, aluminum, copper, lead, tin and magnesium in scrap and alloy form. Amendment, effective July 2, also provides control over imports of commodities for civilian use.

M-65: Cadmium, effective Jan. 17, 1942 amended June 24, 1942. Deliveries prohibited unless authorized by Dir. of Indus. Oper. for essential military and civilian uses. Order M-65-a, effective Jan. 17, 1942, bans cadmium use after March 31, except for government orders, Lend-Lease and to comply with safety regulations issued under governmental authority.

M-66: Cashew Nut Shell Oil, effective Jan. 13, 1942. Use limited to defense orders rated A-2 or better for brake linings or resins required for insulating aviation ignitions or for impregnating electrical coils. Amendment, May 14, 1942, limits use for brake linings to oil from inventory, except for Army, Navy orders.

M-67: Plumbing, Heating, Electrical Supplies, effective Dec. 23, 1941. Revoked by L-63, April 6, 1942.

M-68: Material for Oil Industry, effective Dec. 23, 1941. Restricts use of materials in discovery, development and depletion of petroleum pools, including extraction plants.

M-68-2, June 20, 1942, modifies previous regulations to permit use of necessary materials to drill approximately 800 new wells in Missouri, Kansas and Oklahoma.

M-69: Distilled Spirits, issued Jan. 10, 1942. Requires all distilleries equipped to make 190 proof ethyl alcohol to make that type, starting Jan. 15, 1942. Deliveries subject to direction of Director of Industry Operations.

M-70: Jute, issued Feb. 27, 1942.

M-71: Fats and Oils, effective Dec. 29, 1941. Regulates supply and distribution.

M-72: Tin and Lead Scrap, effective Jan. 8, 1942. Dealers are forbidden to accept deliveries of scrap unless during the preceding 60 days they have disposed of an amount equal to their inventory on date of delivery. Direct allocation by Director of Indus. Oper., provided, when necessary. Dealers must report by 10th of each month to Bureau of Mines on PD-249, consumers on PD-254 detailing inventory, production, purchases, sales and consumption for preceding month.

M-73: Wool, effective Jan. 3, 1942. Processing from Jan. 3, to April 4, 1942, limited to 80 per cent of basic quarterly poundage.

M-73-a: Men's and Boys' Clothing, March 2, 1942. Specifies styles for wool suits, overcoats.

M-75: Diphenylamine, effective Jan 30, 1942. Deliveries only upon instruction of Director of Industry Operations in schedules issued beginning of each month. Application for making deliveries filed on PD-263, application for accepting delivery on PD-262, 266.

M-76: Turbines, effective March 9, 1942. Enables Director of Industry Operations to establish schedules for manufacture of land turbines.

M-77: Rapeseed Oil, March 23, 1942. Use after March 31 limited to making marine engine, heavy machine engine lubricating and pneumatic tool oils; factice for compounding rubber; blown rapeseed oil used in manufacture of above grades.

M-78: Mercury, effective Jan. 23, 1942. Use for following banned April 1: Carroting of hat fur; marine anti-fouling paint; thermometers (except industrial and scientific); treating of green lumber (except Sitka spruce); turf fungicides; vermilion; wall switches for nonindustrial use; wood preservation. Quarterly use for following limited to 1940 period or 1941 first quarter: Fluorescent lamps; health supplies; mercuric fulminate for ammunition; industrial and scientific thermometers. Use of mercuric fulminate for commercial blasting caps limited to 125 per cent of base period.

M-79: Asbestos, effective Jan. 20, 1942, amended June 18, 1942. Starting Feb. 1, 1942, processing of various grades of imported fibre prohibited, except to fill certain specified defense orders. Permission of Dir. of Indus. Oper. required to install high-temperature pipe covering, except for installations of 212 degrees Fahr. or over. Ship and underground installations exempted from latter. Processors file PD-251 or PD-252 by 10th each month. PD-253 filed upon request.

M-80: Sole Leather, effective March 12, 1942. Set aside 80% of top grade leather soles for military shoes.

M-81: Tin Plate, Terne Plate, effective Feb. 11, 1942. Specifies products that may be packed in cans, sizes of cans to be used, amount of tin and tin plate allowed for can manufacturing. Small sizes generally eliminated. No limitation placed on can production for packing fruits and vegetables of primary importance. Those of secondary importance and important medical, chemical, dental and industrial products limited to 100% of 1940 use. Products not specifically listed, including beer, tobacco, dog food, petroleum products, may use 50% of tin plate and terne plate required in corresponding 1940 period until March 1, none thereafter. Use of tin plate with tin coating of 1.5 pounds per base box permitted for cans to pack certain acid-type foods. No restrictions on orders with rating higher than A-2. Delivery and use through 1942 permitted of cans of any size for primary and secondary products which completely made or parts cut or in canner's possession Feb. 11. Use PD-269 to seek exemption from order. M-81-a, June 13, requires substitution of electrolytic tin plate and treated black plate for hot-dip tin plate in making cans for specified products. Amendment, June 27, bans tin and terne plate for paint cans, certain miscellaneous products.

M-82: Hemp Seed, effective Jan. 23, 1942.

M-83: Teak, effective March 5, 1942. Restricts use to Army and Navy.

M-84: Agave Fiber, effective Feb. 20, 1942.

M-85: Kapok, effective Feb. 4, 1942. Restricts consumption to military and a few essential civilian uses.

M-86: Canned Foods, effective March 13, 1942. Directs canners to set aside quantities as ordered by Director of Industry Operations under M-86-a. Amendment, April 13, 1942, requires canners to provide materials necessary to pack in export boxes canned goods set aside for armed forces.

M-89: Corundum, effective Feb. 7, 1942. All deliveries allocated by Director of Industry Operations. Sellers required to file PD-293 with WPB by Feb. 20, 1942, and by 10th of succeeding months.

M-91: Cotton Duck, effective Feb. 28, 1942. Limits deliveries to fill orders rated better than A-2.

M-92: SXP Cotton Seed, Feb. 20, 1942.

M-93: Wood Pulp, effective March 12, 1942. Provides for complete allocation.

M-95: Rhodium, effective March 11, 1942. Prohibits use in jewelry plating, except for current stocks. Sellers report to WPB on PD-295, consumers on PD-296. Amendment, April 17, 1942, bans all use of rhodium in jewelry manufacture.

M-96: Agar, effective Feb. 9, 1942.

M-97: Coal and Coke, effective Feb. 13, 1942. Inventory restrictions of Priorities Regulation No. 1 revoked as they affect coal and coke, permitting inventory accumulation by consumers.

M-98: Raw Cane Sugar, effective Feb. 15, 1942.

M-100: Rationing of Trucks, Truck-Tractors, Trailers, effective March 9, 1942. Program to be administered jointly by WPB and Office of Defense Transportation. Application forms and instructions available at truck sales agencies. Applicants approved by WPB and ODT receive Certificate of Transfer, issued by Director of Industry Operations, permitting purchase. Preference given military forces, police, public health and sanitation services, communication services and transportation directly connected with war effort. PD-310 is application form.

M-101: Mica, effective March 6, 1942.

Prohibits processing of block mica of quality better than heavy-stained, except for government and Lend-Lease orders. Processors report to WPB on PD-325. Amendment, May 23, forbids use in any Army or Navy product not war implement. WPB authorizes uses after July 1.

M-103: Goose, Duck Feathers, Feb. 24, 1942.

M-103: Dyestuffs, March 28, 1942. Earmarks various dyes for war use and restricts civilian use of others.

M-104: Closures for Glass Containers, effective April 3, amendment May 30, 1942. Limits use of blackplate for beer and nonalcoholic beverage bottle closures to 60% of tonnage used in 1941. Bans tinplate or terneplate use in making closures for wine, distilled spirits or malt beverages. Blackplate for wine or spirits barred Aug. 1. Does not apply to scrap or reclaimed material. Tin and terne plate banned for screw bands for two-piece home-canning closures, and closures for containers of specified foods and other products.

M-106: Shellac, effective April 14, 1942. Restricts use by makers of phonograph records and radio transcriptions to about 30% of 1941 consumption, by others to 75% of corresponding 1941 period rate until June 30 and 35% by quarters thereafter. Freezes 50% of all inventories of 10,000 lbs. or more and 50% of future imports for sale to Defense Supplies Corp. Persons holding 5000 lbs. on April 1 must report to WPB by May 9 on PD-334.

M-108: Can Enamel, effective March 23, 1942. Prohibits enamel on can ends, except to protect printing which designates contents, or to coat ends made of electro-plated sheet or untinned material. Sale of enamel for prohibited uses banned.

M-109: Rough Diamonds, March 27, 1942. Requires owners of 10 carats or more on March 31, 1942, to report them to WPB on PD-376 by April 30, 1942. Sales and imports of more than 5 carats must be reported within 10 days on PD-377; smaller sales reported monthly on PD-378. Does not cover cut or polished gems nor rough diamonds in a tool in use. Diamonds in unused tools must be reported.

M-110: Molybdenum, issued March 18, 1942, effective May 1. Covers all forms, including scrap. Provides for complete allocation. Buyers file PD-358 and 359 with WPB by 20th of month for delivery following month. PD-360 filed with WPB and supplier to request delivery. Buyers of less than 50 pounds per month do not file.

M-111: Tea, March 27, 1942. Regulates deliveries to distributors.

M-112: Antimony, March 30, 1942. Full allocation starts May 1, 1942. Effective July 1, use banned for paints, lacquers, enamels or for toys and ornaments; new antimony use for auto battery alloys limited to 7% of total and total antimony content of such alloys limited to 7½% by weight. No alloy may contain more than 0.5% antimony, or 0.5% above amount required by specification. Consumers file orders with suppliers by 20th each month on PD-381 and report to WPB on PD-380. Holders of more than 100 pounds of antimony must file PD-380 by April 20.

M-113: Canners' and Canmakers' Boxes, effective March 23, 1942. Revokes inventory restrictions as they affect seasonal demand for packing boxes.

M-114: Goatskins, Kidskins, Cabrettas, effective March 30, 1942.

M-115: Collapsible Tin Tubes, effective April 1, 1942. Bans production of tubes containing more than 7½% tin, except for certain pharmaceutical preparations. Permits use of tubes containing 7½% tin for tooth pastes and shaving creams, but retail buyers must turn in used tube for each new one bought. Used tubes disposed of to Tin Salvage Institute, Newark, or other Metal Reserve Co. agents.

M-116: Closure Enamel, effective April 30, 1942. Prohibits enamel use on exterior of tin or terne plate closures for glass containers, except to protect necessary lithographed printing, or if closures sterilized for use with human food, or if closures made of electro-plated tinned sheet. When used, enamel weight should be no more than nine-tenths of 1940 standard practice.

M-118: Honey, effective March 26, 1942.

M-119: Rubber Sealed Closures, effective April 9, 1942. Beginning April 19, 1942, manufacture and sale of rubber sealed closures for glass containers used in packing certain foods prohibited. Use of such closures for packing specified products banned May 9, 1942.

M-122: Mahogany, effective May 26, 1942. Restricts use to government orders; aircraft, boats and ships; patterns and models in making products rated A-10 or higher.

M-123: Asbestos Textiles, effective March 30, 1942. Limits deliveries to makers of industrial packings, such as gaskets, pump packings, etc., and to fill orders rated A-10 or higher.

M-125: Loofa Sponges, effective April 8, 1942. Sale, delivery or use limited to orders rated A-1-a or better.

M-126: Iron and Steel Use, effective May 5, 1942. Permits receipt of iron and steel for 15 days by makers of more than 400 common civilian products; processing for 45 days up to 75% of average use of all metals in 1941; assembly for 90 days; all use prohibited thereafter. Certain items may be made for Army, Navy, Maritime Commission for 90 days. Manufacture of roofing and siding permitted for certain purposes for rest of 1942 at 20% of 1940 output. Appeals filed on PD-37 with WPB field offices.

M-127: Spices, May 8, 1942.

M-128: Zinc Sulphide Pigments, effective May 5, 1942. Requires manufacturers to set aside certain percentage of production for allocation in following month.

M-129: Waste Paper, effective April 6, 1942. Permits makers of paper and paper products to accumulate waste paper inventories without restriction.

M-130: Passenger Automobiles, effective June 8, 1942. Provides for rationing cars to armed forces and government agencies.

M-131: Quinine, effective April 4, 1942 Amended April 30, 1942.

M-132: Sulfur, effective April 18, 1942. Permits receipts of sulfur in excess of practical minimum working inventory.

M-133: Rotenone, effective April 13, 1942.

M-134: Tape, April 27, 1942. Assigns A-2 rating to orders for cotton fabrics used in making industrial cloth or tape.

M-135: Coffee, effective April 28, 1942.

M-137: Benzene, effective April 20, amended June 1, 1942. Provides for complete allocation. Buyers apply on PD-223-A. Producers and distributors file PD-224-A. Use as motor fuel prohibited.

M-141: Horsehide, effective May 25. Controls disposal of horsehide leather meeting military specifications.

M-143: Indian Kyanite, effective May 6, 1942. Includes andalusite and sillimanite. Provides complete allocation. Suppliers and consumers using kyanite to make refractories file PD-466 by 20th each month with WPB.

M-144: Fuel Oil, effective May 5, 1942. Permits sales and deliveries of fuel oil without regard to previous preference ratings. Ratings may be assigned for purchases only by ocean-going vessels.

M-145: Cocoa, effective May 11, 1942.

M-146: Quartz Crystals, effective May 18, 1942. Restricts use generally to telephone equipment and implements for war use.

M-148: Exports of Critical Material, effective May 12, 1942. Gives preference to exports to other American republics, within limitations of specific allocations by Requirements Committee of WPB, over orders for such materials to extent necessary to meet delivery schedules set by board of Economic Warfare and WPB. Amendment May 15, removes farm equipment from list.

M-147: Cashew Nuts, May 20, 1942.

M-149: Phosphate Rock, effective May 11, 1942. Removes restrictions on inventory acquisition.

M-150: Aromatic Petroleum Solvents, effective May 25. Limits deliveries, to orders rated A-2 or better, beginning June 15. Requires pool accumulation by producers for distribution by WPB and diversion of remaining output to production of nitration toluol or aviation gasoline.

M-152: Arsenic, effective May 22. Allocates supplies quarterly. Buyers file PD-490 with suppliers.

M-153: Acrylonitrile, effective May 14, 1942.

M-156: Tantalum, effective May 22. Allocates supplies monthly. Users file PD-487 and 488 by 20th, processors PD-489 by 27th.

M-157: Chemical Cotton Pulp, effective May 28. Provides for complete allocation.

M-158: Drum Exterior Coating, effective May 30, 1942. Restricts use after June 20 of coatings containing certain organic binders or pigments for coating 2-gal. or larger containers to export use (except coatings containing tung or oiticica), or orders for armed forces or Maritime Commission. Limits colors to black.

M-160: Beryllium, effective June 1, 1942. Provides for complete allocation. Buyers file PD-496 by 20th of month, also PD-497 monthly. Latter also required of persons with 10 lbs. or more of contained beryllium in possession in any month. Until July 1, delivery without allocation to make articles rated A-1-c or higher permitted.

M-162: Platinum, effective May 30, 1942. Limits sales and purchases to refiners, dealers, distributors, processors, consumers. Sales must be reported by 15th each month on PD-513, purchases on PD-514 by same date.

M-172: Imported Canned Beef, effective June 22, until Oct. 1, 1942.

M-174: Elastic Fabrics, effective June 24, 1942. Limits use to essential health articles and military products. Permitted uses include industrial shoes, belting, flexible metallic hose, and webbing for respirators, hose masks, inhalators and goggles.

M-175: Ethyl Cellulose, effective June 18, 1942. Provides complete allocation control. Deliveries of 50 lbs. at one time in one month do not require specific authorization by WPB. Producers report monthly deliveries by 20th on PD-549, buyers file PD-550 by 15th with orders.

M-179: Pyrethrum, effective June 13, 1942. Provides for full allocation.

"P" ORDERS

P-5-b: Cranes and Hoists, effective Nov. 1, 1941. Assigns A-1-a, b, c ratings on deliveries of materials required to fill defense orders. Rating may be applied only to: Motors and other electrical accessories; alloy and carbon steel cars, forgings, castings, plates, sheets, shapes and tubes; ferrous and nonferrous castings; machine parts and accessories; cutting tools; abrasives; measuring instruments and gages; brass, copper and steel tubing and fittings; oil resisting hose; hydraulic bridge brakes; gasoline and diesel engines and accessories; paints, lacquers and finishing materials; maintenance and shop supplies; foundry supplies, including scrap, pig iron, coke, and alloys. Use Forms PD-81, 81a, 88.

P-6: Defense Supplies Rating Plan, effective May 31, 1941. Replaced by Production Requirements Plan (P-90), Jan. 1, 1942.

P-6-a: Civil Aircraft, Repair Parts and Accessories, effective July 21, 1941, rating A-10. Rating applies to parts for repair of all registered and certificated civilian and publicly owned airplanes.

P-7: Material and Equipment Entering into the Production of **Merchant Ship Construction,** effective June 12, 1941, ratings A-1-a (1941), A-1-b (1942), A-1-c (1943).

P-8: Material Entering into **Freight Car** Construction, effective June 18, 1941, rating A-3.

P-9-a-b-c-d-e-f-g: Heavy Bombers, effective June 26, 30, 1941. Replaced by P-109, Feb. 20, 1942.

P-10: Material and Equipment Entering into the **Conversion of Ships,** effective June 19, 1941, rating AA. Use Forms PD-41, PD-41-a.

P-11-a: Metalworking Equipment, effective Sept. 30, 1941, revoking P-11, P-2. Ratings as assigned by Priorities Division are applicable to deliveries of same materials included in P-5-b except brakes and engines. Rating may be extended by supplier. PD-81 used to report monthly assignments of rating, PD-88 to apply for rating.

P-12: Aluminum Scrap, effective June 26, 1941. Repealed by M-1-d, Jan. 7, 1942.

P-13: Material Entering into the Production of **Airframes,** effective July 3, 1941. Replaced by P-109, Feb. 20, 1942.

P-14-a-b: Material and Equipment Entering into the Construction of **Ship Ways,** effective July 12, 1941, rating A-1-a (1941), A-1-b (1942-43).

P-15: Material for **Electrical Relays** and Solenoid Assemblies, effective July 11, 1941. Replaced by P-109, Feb. 20, 1942.

P-17: Canning Machinery, expired Aug. 31, 1941.

P-18: Cutting Tool Equipment, effective July 31, 1941; revoked by P-18-a, effective Aug. 28, 1941. Assigns A-1-a rating to deliveries of materials required in producing following tools for defense orders: Drills, reamers, countersinks, counterbores, spotfacers, taps, chasers for self-opening die heads, chasers for collapsing taps, milling cutters, form tools, gear cutting and finishing tools, hobs, boring bars and tools, metal cutting shear knives, metal cutting circular saws and machine broaches. Rating also may be used by suppliers of the producer. Materials affected include high-speed, carbon tool and alloy steel bars, sheets, rods, shapes, forgings and castings; cutting tools, abrasives; measuring instruments, maintenance and shop supplies. Use PD-6 (revised) for tabulation of rating extensions. After July 1, 1942, priority assistance must be obtained under Production Requirements Plan.

P-19, 19-a: Defense Projects. Superseded by P-19-h.

P-19-b: Defense Projects, with protected delivery dates, effective July 30, 1941. Expired Dec. 31, 1941.

P-19-c: Material entering into construction of publicly financed defense housing, effective as issued, rating as assigned. Rating may be extended at any time within three months after assigned.

P-19-d: Material entering into construction of housing projects for defense workers, effective Sept. 9, 1941, rating as assigned. Rating may be extended at any time within three months after assigned.

P-19-e: Material entering into construction of road projects, effective Oct. 18, 1941, rating as assigned. Use Form PD-81. Amendment, effective March 6, 1942, eliminates extension of ratings to purchase road building machinery and equipment. May be used for repair parts needed to prevent work stoppage, perishable tools, temporary work.

P-19-g: Defense Housing, by builders under FHA, effective Dec. 31, 1941.

P-19-h: Rated Projects, effective when issued, rating as assigned to builders for delivery of material entering into construction of various projects.

P-19-i: Aluminum, Magnesium Plants, rating A-1-a, A-1-b on delivery of construction material.

P-20, P-21: Locomotives, effective July 21, 1941. Expired April 30, 1942.

P-24: Experimental, Research Work, effective Aug. 5, 1941. Expired March 31, 1942.

P-25, P-26 series: Tanks. Expired May 31, 1942. Ratings obtained under Production Requirements Plan.

P-29: Health Supplies Rating Plan, effective Aug. 25, 1941, rating A-10. Use Forms PD-79, PD-81. Amendment, Feb. 14, 1942, substitutes endorsement on purchase orders for furnishing copies of P-29 to extend rating.

P-31: Foundry Equipment, effective Sept. 5, 1941. Expired May 30, 1942. Ratings obtained under Production Requirements Plan. P-31-a, June 5, makes outstanding ratings effective until deliveries completed.

P-35: Half-Track Vehicles, effective Dec. 5, 1941. Expired May 31, 1942. Ratings obtained under Production Requirements Plan.

P-37: Insecticides, germicides, fungicides, effective Dec. 31, 1941, rating A-10.

P-38: Material Entering into the Production of **Radiosondes,** effective Aug. 26, 1941, rating A-1-d. Use Forms PD-6, 6-a.

P-39: Welding Machines, effective Sept. 12, 1941. After May 1, 1942, ratings must be obtained through P-90.

P-40: Industrial Lift Trucks, effective Sept. 12, 1941. After May 10, 1942, ratings must be obtained through P-90.

P-41: Material Entering into the Construction, Maintenance and Operation of **Defense Projects,** effective Aug. 27, 1941, rating A-1-a. Applies only to Pan American Airways Inc. Form PD-6.

P-42-a: Material entering into maintenance and repair of **Canning Machinery** and Equipment, effective Sept. 12, 1941. Issued to American Can Co. Expired March 12, 1942.

P-43: Laboratory Supplies, Equipment, effective Aug. 28, 1941. Assigns A-2 rating to deliveries of materials to be used for scientific research conducted by the laboratory, or which will enter into production of such materials. PD-93 used to report orders to which rating assigned. PD-88 for application for rating. PD-107 is questionnaire to rating applicants.

P-45: Fire Apparatus, effective Oct. 31, 1941. Amended Feb. 28, 1942. Assigns A-2 rating to deliveries of material required to fill defense orders, limited in quantity and kind by Director of Industry Operation on PD-82. P-45-a, effective Nov. 22, 1941, gives A-8 rating to purchases of fire fighting equipment by U. S. Forest Service.

P-46: Utilities, effective Sept. 17, 1941; amended Nov. 25, 1941, March 26, 1942. Grants A-2 rating to materials required for maintenance, repair and operating supplies for power plants and pumping plants; A-5 rating granted for all other facilities, for materials to extend service to projects having A-5 or better rating and for materials needed to protect plants against sabotage. Supplier's rating is A-5. Power line extensions to new consumers limited to 250 feet. Scheduled material deliveries and stock withdrawals, except in emergencies, limited to 1940 rate. Rating use for capital additions limited to $1500 for underground connections, $500 for other additions.

P-47: Material Entering into the Maintenance and Repair of **Air Transportation Facilities,** effective Sept. 6, 1941, rating A-3. Use PD-96. Raised to A-1-j March 6, 1942.

P-51: Material Entering into the Production of **Canning Machinery** and Equipment, effective Sept. 22, 1941, rating A-3. Applies to Food Machinery Corp.

P-53: Textile Machinery Parts, effective Sept. 13, 1941. Assigns A-10 rating to deliveries of material for production of parts for maintenance and repair of textile machinery and equipment. Supplier of material also may extend rating assigned him by producer PD-88 to apply for rating. Effective Feb. 28, 1942, rating is A-8.

P-54: Trucks, Trailers, Buses, effective Sept. 12, 1941. Assigns A-3 rating to materials for buses and truck trailers and medium and heavy truck bodies and cabs. Deliveries after June 30 limited to producers filing under P-90 before June 1.

P-55: Defense Housing Projects, effective when issued. Applies rating as determined by Dir. of Indus. Oper. to certain authorized materials required in connection with privately financed defense housing projects. Application for rating to be filed on Form PD-105. Amendment, March 3, 1942, provides that suppliers who process material extensively should apply for assistance under P-90 on PD-25a. Rating extended by builder or sub-contractor must be countersigned by FHA agent.

P-56: Mines, Sept. 22, 1941; amended, Dec. 2, March 2, May 15, 1942. Assigns A-1-a rating to material deliveries for repairs in event of breakdown; A-1-c to material up to minimum required to avert breakdown; A-1-c to material for other repairs to selected list of machinery and equipment. (Less essential mining enterprises may use A-1-c rating only in case of imminent breakdown); A-8 for other repairs, maintenance, operating supplies essential to operations; A-10 for all other repair, maintenance, operating supplies. Approval of Director of Industry Operations necessary to apply A-1-a, A-1-c ratings for machinery and equipment. Inventories of operating supplies in relation to production must not exceed average ratio of 1938, 1939, 1940. Operators report on PD-119 to designated state agency by 10th of each month on purchases. Amendment, April 13, 1942, grants use of A-1-c rating to obtain explosives.

P-56-a: Mining Machinery and Equipment, issued Dec. 31, 1941, replacing P-23. Amended March 2, 1942. Provides for ratings—dependent on ratings of orders producer is filling—to delivery of materials for production of mining machinery and equipment, and parts thereof, of specified types. Rating may be extended by supplier. Application for assistance made on Form PD-25a, covering requirements for three months. Amendment, April 13, 1942, permits use of ratings in making deliveries to companies operating under P-58, P-68, P-73 and, with special permission, P-65-a. Amendment, June 12, limits deliveries to purchases with ratings assigned under P-56, 58, 68 or 73.

P-57: Automobile Repair Parts, effective Sept. 18, 1941. Assigns A-10 rating to deliveries either to a producer or to his supplier of material required for production of replacement parts for passenger cars, and trucks of less than 1½-tons capacity.

P-58: Supplies for South American mines, effective Oct. 8, 1941; amendment issued Feb. 14, 1942, effective as of Jan. 1, 1942. Includes Cerro de Pasco Copper Corp., Andes Copper Mining Co., Chile Exploration Co., Braden Copper Co. Assigns A-1-d rating to orders for delivery before Oct. 2, 1942 in quantities double those shipped April 1—Sept. 30, 1941; A-3 to deliveries June 30—Oct. 1, 1942. Total acquired under both ratings limited to three times shipments during base period.

P-61: Copper Scrap, effective Oct. 13, 1941. Revoked by amended M-9-b, Jan. 6, 1942.

P-62: Material for production of **Laboratory Equipment,** Reagent Chemicals, rating A-5, effective Nov. 15, 1941.

P-65: Marine Paints, effective Dec. 5. A-3 rating assigned for raw materials upon filing PD-82 with WPB.

P-68: Steel Plant Maintenance, Oct. 31, 1941, amended April 11, 1942. Assigns A-1-a rating to materials for repair of iron or steel plant facilities in event of actual breakdown when parts are not otherwise available; A-1-c to material to make reasonable advance provision to avert breakdown (A-1-a, A-1-c ratings available only after advance approval by Dir. of Indus. Oper.); A-1-c to deliveries for ordinary maintenance, repair or operating supplies to 30% of material ordered in one quarter, A-3 to 70%. Deliveries not permitted if inventories exceed 125 per cent of dollar volume on last day of preceding calendar half-year. Quarterly withdrawals from inventory must not exceed 55% of volume in preceding six months. Amendment, Feb. 27, 1942, extends order to Canadian and detinning plants; provides A-10 rating for supplies not directly related to actual production. PD-148 used to apply for rating. PD-228 filed monthly to report A-1-c applications.

P-71: Material entering into completion of certain **Private Housing Projects** not qualifying under P-55, issued Dec. 23, 1941, rating A-10. Expired March 31, 1942.

P-72: Elevator, Escalator Repair Parts, effective Nov. 10, 1941, amended Jan. 22, 1942. Assigns A-3 rating to deliveries of materials used to make repair parts for elevators, escalators and dumbwaiters. Limited to quantities and kinds of material authorized on Form PD-25A. Separate application required if parts to be used in South and Central America and Caribbean area.

P-73: Smelters, Refiners of Copper, Lead, Zinc, Antimony, Mercury, Cobalt, issued Dec. 22, 1941. Assigns A-1-a rating to material for repair of actual breakdown; A-1-c for material to avert breakdown; A-3 to other material for repair maintenance or operation, also for deliveries to suppliers. Producers must file PD-212 with WPB before applying rating. PD-248 lists purchases of materials.

P-74: Heat Treating Furnaces, effective Nov. 22, 1941. Assigns A-1-c rating to deliveries of certain materials to manufacturers of furnaces used in heat treatment of metals, when such furnaces are used to fill defense orders. Materials affected include rolled steel bars, plates, sheets, shapes and tubes; ferrous and nonferrous forgings and castings; abrasives; indicating instruments; refractories and insulation; controlled atmosphere generators; burners and accessories; finishing materials; maintenance and shop supplies; foundry supplies, including scrap, pig iron, coke and alloys. Rating may be used to make spare parts. After June 30, holders of ratings must qualify under P-90.

P-75: Material for production of **Tackle Blocks,** rating A-1-c, effective Oct. 24, 1941. File PD-82 to obtain rating.

P-76: Steel sheets, 16 and 18 gage, for manufacture of **Drums,** rating A-4, effective Nov. 17, 1941. Use PD-156a to apply for rating. Amended Dec. 31, 1941 to permit acquisition of sheets of any gage.

P-77: Rebuilt Machine Tools, effective Nov. 10, 1941. Expired May 1, 1942. Ratings for material obtained under Production Requirements Plan.

P-78: Conveyor Machinery, effective Nov. 10, 1941. Expired Jan. 31, 1942. Priority assistance obtained under P-90 by filing PD-25 A.

P-79: Non-Metal Containers, effective Nov. 14, 1941, amended March 11, May 16, 1942. Assigns A-7 rating to deliveries of steel wire, A-5 other ferrous materials (A-1-c to make containers for perishable food) to producers of cooperage and wooden and paper board containers. Ratings may be applied only to quantities and kinds of material authorized by Director of Industry Operations on PD-82.

P-82: Blind-made Products, effective Nov. 29, 1941. Expired April 30, 1942.

P-84: Plumbing, Heating Repairs, effective March 13, 1942. Assigns A-10 rating to materials for emergency repairs. Does not apply to copper parts or scarce materials for which substitutes available.

P-85: Resistance Welding Electrodes, effective Dec. 3, 1941. Assigns A-1-c rating to deliveries of materials used in making spot welding tips, resistance welding dies, seam welding wheels, water-cooled holders for tips. Use PD-82 to obtain rating.

P-86: Industrial Explosives, effective Dec. 12, 1941, rating A-8. Use Form PD-82.

P-88: Railroad Material, effective March 17, amended June 17, 1942. Assigns A-1-a rating for materials needed for emergency repairs upon specific approval of WPB; A-1-j for materials essential for track, structure, signal and train and locomotive repair and operation, including perishable tools; A-8 on all other maintenance repair and operating supplies. Inventories reported on PD-352.

P-89: Chemical Plants, effective Jan. 23, 1942. Amended May 22. Assigns A-1-a rating for repairs in event of actual breakdown of plant; A-1-c for repair material up to minimum required to avert breakdown; A-3 for 70% of other material for repair, maintenance or operation, A-1-c to other 30%; A-1-c for material delivered to supplier or sub-supplier. Rating may be used only after serial number assigned by Chemicals Branch, WPB, to producer upon application. Ratio of materials inventory to current operations must not exceed average of 1938, 1939 and 1940. Amendment, March 2, 1942, redefines operating supplies, excludes materials incorporated into producer's products. Permits Canadian firms to use ratings.

P-90: Production Requirements Plan, issued Dec. 3, 1941, effective first quarter of 1942. Replaces Defense Supplies Rating Plan (P-6). Ratings covering materials needed for defense or essential civilian production during that quarter assigned by Director of Indus. Oper. after applicant files Form PD-25A. One or more ratings may be assigned to cover all or any specified part of applicant's requirements. Capital items may not be obtained by rating assigned by this order. No ratings

other than those authorized in PD-25A may be used by those operating under the plan.

Amendment, Jan. 30, 1942, permits extension of AA ratings without special permission from Production Requirements Branch. PD-25F is application used to expedite delivery and to seek rating on additional material or higher ratings. Modified Production Requirements Plan, for manufacturers with annual sales under $100,000, uses Form PD-25-X (discontinued May 23). Amendment, March 10, 1942, permits use of ratings assigned by other certificates to obtain material not regularly carried in stock.

Priorities Regulation No. 11, issued June 10, makes use of Production Requirements Plan mandatory, starting July 1, for companies using $5000 or more of basic metals quarterly.

P-91: Elevators, Escalators, Dumbwaiters, issued Dec. 30, 1941. Assigns A-2 rating to deliveries of material required for building this equipment on defense orders only. Permission to use rating must be authorized by Div. of Indus. Oper. on Form PD-25A, covering kinds and quantities of materials to be used in succeeding quarter.

P-92: Steel Plate and Welding Electrodes, issued Jan. 17, 1942. Assigns priority to deliveries of these materials to training classes for welders under United States Office of Education, Rating determined after application received on PD-183. No more than 30 per cent of plate deliveries may be new material.

P-95: Farm Machinery and Parts, effective Dec. 27, 1941. Assigns A-3 rating to deliveries of material for production of new machinery and parts as limited by order L-26. Note: P-32, P-33 revoked. Use PD-81.

Amendment, March 30, 1942, adds irrigation equipment to items in building of which A-3 rating available for delivery of material.

Amendment, April 16, 1942, assigns A-1-a rating until June 30, 1942, to insure delivery of 346,507 tons of material, mostly iron and steel, during period April 1-June 30. Material may be used only in manufacture of specified equipment. Receipts limited to specified percentages of total consumption in 1940. Rating use reported monthly on PD-81.

P-98: Petroleum Industry Materials, effective Jan. 14, 1942. Assigns following ratings to delivery of materials: A-1-e for geological search for unknown pools, A-2 for search by exploratory wells; A-2 for research laboratories seeking higher production methods; A-8 for maintenance, repair or operating supplies; A-1-a for repairs of actual breakdown, except transportation equipment which takes A-2; A-1-c to avert breakdown of producing or refining equipment; A-2 for certain chemicals and other materials used in refining; A-8 for making alterations. Permission of OPC in Washington necessary to use A-2 or higher rating, except for research or laboratory purposes. OPC field representative must sign orders with A-8 or lower rating for supplies valued at over $500. Amendment, March 15, 1942, adds office supplies and certain automotive equipment to items to which P-98 ratings may be extended. Amendment, June 19, 1942, extends similar priority assistance to Canadian petroleum operators.

P-100: Repairs, Maintenance, Supplies, effective Dec. 18, 1941, revoking P-22, rating A-10. Limits stocks of materials for these purposes to 110 per cent of purchases in corresponding 1940 quarter. Withdrawals from inventory similarly limited. Does not apply if purchases or withdrawals are $5000 or less per quarter. May not be used for material required for plant expansion or improvements. Plants working overtime get extra allowances. Operating supplies include ferrous parts used to make containers. Application for rating not required. Does not apply to mines. Amendment, Feb. 10, 1942, makes those using tools or equipment to repair or maintain farm machinery, and Canadian firms buying war or essential civilian materials in United States eligible for priority assistance. Amendment, Feb. 28, 1942, extends A-10 rating to boiler inspectors, etc. Amendment, March 9, 1942, assigns A-10 rating for repair and maintenance of refrigerating equipment in stores and restaurants.

P-101: Bookbinding Wire, effective Jan. 24, 1942. Assigns A-8 rating to materials for manufacture of flat steel wire used for binding processes in printing and publishing industries, excluding pre-formed staple, box stay and specialty binding wire. Used only for materials authorized by Dir. of Indus. Oper. upon submission of Form PD-82. WPB determines requirements on quarterly basis.

P-103: Gasoline Refinery (British), Dec. 29, 1941. Assigns A-1-c rating to Anglo-American Purchasing Co., New York, for operating materials.

P-106: Copper and Brass Mill Maintenance: issued Feb. 7, 1942. Provides A-1-a rating to material for repair in event of actual breakdown; A-1-c for material to make reasonable provisions to avert immediately threatened breakdown; A-3 to deliveries of other material for repair, maintenance, operation. Use of A-3 rating to obtain "other material" limited to quantities obtained in 1941. Authorization by WPB necessary to use A-1-a or A-1-c ratings. Ratio of current operations to inventory of repair, maintenance and operation material must not exceed average for 1938, 1939 and 1940. Amendment, May 14, grants A-1-c rating to suppliers to replenish inventories.

P-107: Repair Parts for Medium and Heavy Trucks, Truck Trailers, Passenger Carriers, effective Jan. 22, amended March 6, 1942. Assigns A-2 rating to deliveries of material entering into manufacture of specific list of parts. Manufacturers must file PD-25A by June 1 for rating to be effective on deliveries after June 30, 1942.

P-108: Fire Protective Equipment, effective Feb. 26, 1942. Assigns A-7 rating to deliveries of steel pipe, cast iron pipe and fittings for use in making such equipment, A-3 for other materials, to be specifically authorized by Director of Industry Operations.

P-109: Aircraft Products, effective Feb. 20, 1942, replacing P-3, P-4, P-9-a through P-9-g, P-13, P-15, P-52. Assigns A-1-a rating to material entering into military aircraft products. May be applied only if material not otherwise available and if material physically incorporated into aircraft products or is necessary in production. Covers aircraft, engines and propellers, delivery schedules of which are approved by Joint Aircraft Committee, components and spare parts. Amendment, March 11, 1942, abolishes distinction between material incorporated into products and other material used to build aircraft. Applies to tactical types of craft, P-109-a, effective March 11, 1942, assigns A-1-b rating to material for trainer types of planes, other provisions similar to P-109. Amendment, June 17, 1942, permits suppliers not required to come under PRP to extend ratings to fill orders rated under P-109 and P-109-a after expiration of these orders.

P-110: Remodeling Projects, issued April 10, 1942. Provides A-5 rating to deliveries to builders and subcontractors of materials on Defense Housing Critical List costing not over an average of $100 per room for remodeling dwellings in Defense Housing Critical Area. Cost of scarce materials per structure limited to $800. Builders file PD-406 with local FHA office to apply for rating. Rated projects exempt from L-41.

P-115: Canning Plant Maintenance and Expansion, effective Feb. 11, 1942. Assigns A-1-a rating to plants canning fruits or vegetables, for emergency repairs to avert spoilage of food in event of actual breakdown. WPB must be advised when rating used. A-3 rating granted for other material for replacement, addition or expansion. Excludes all new buildings, and new production lines used for canning other than peas, tomatoes.

P-116: Osnaburg, effective Feb. 14, 1942, rating A-1-j to Defense Supplies Corp.

P-118: Dairy Machinery, effective April 18, 1942. Assigns A-2 rating for materials required for emergency repairs, A-3 for normal repairs to dairy equipment.

P-120: Aluminum, Magnesium Plants, issued March 20, 1942. Covers producers and basic fabricators on plant repairs, maintenance and operating supplies, applicable when specifically assigned by WPB. PD-371 used to apply for rating, PD-372 to report quarterly use of ratings. A-1-a rating assigned to material required in event of actual plant breakdown, A-1-c for materials required to avert breakdown, A-1-j to other materials. Suppliers may extend A-1-a or A-1-c rating only if unable to fill order from inventory; rating to replace supplier's inventory is A-1-j.

P-122: Aircraft, effective March 9, 1942. Raises to A-1-a or A-1-b all ratings previously assigned by preference rating certificates PD-1, PD-1A, PD-3, PD-3A or PD-5 for military and naval aircraft. A-1-a applies to tactical planes, A-1-b to trainers.

P-126: Refrigerating, Air Conditioning Machinery, issued April 20, 1942. Provides A-1-a rating for materials for repairs in event of breakdown of blast furnace air conditioning equipment, A-3 for material to avert breakdowns. Similar ratings provided for certain food storage and processing equipment.

P-129: Communications, effective April 23, 1942. Provides A-3 rating to radio or wire communication service operator for materials essential for maintenance, repair and protection of service. Inventory limited (effective Sept. 1) to 27½% of dollar value in 1940. P-130, effective April 23, provides A-3 rating to materials used in normal operations and costing under $50.

P-131: Officers Uniforms, effective June 8, 1942. Assigns A-1-i rating. After July 1, ratings for metal buttons, closures obtained under P-90.

"E" ORDERS

E-1-a: Machine Tools, effective Jan. 15, 1942, revoking E-1. Contains names of contractors (urgency standing) to receive preference in tool delivery. Guides tool makers in delivery schedules when preference ratings alike. List not made public. Amendment, March 26, 1942, excludes drill chucks from types of chucks controlled by order. Prevents orders received after March 25, 1942, for any tool from being given priority in production schedules unless rating assigned by PD-1A or PD-3A or Order P-19-h endorsed on order. E-1-b, May 1, 1942, apportions deliveries 75% to Service purchasers, 25% to foreign buyers and essential domestic and Canadian industries. E-1-c, effective June 16, 1942, assigns A-1-a rating to orders of certain Canadian buyers.

E-2: Cutting Tools, effective July 17, 1941. (Amendment), effective July 25, 1941; superseded by E-2-a, effective Aug. 28, 1941; limits deliveries to orders with A-10 or higher rating. Buyers must certify deliveries will not increase stocks above 90-day supply.

E-3: Machine Tools, allocation for United Kingdom, effective Jan. 12, 1941.

E-4: Second Hand Machine Tools, effective Feb. 3, 1942. Authorizes Director of Industry Operations to prohibit sale or other disposal of any second hand machine tool and to determine allocations.

E-5: Gages, Precision Measuring Tools, Testing Instruments, Chucks, effective June 15. Requires rating of A-10 or higher for delivery. Certain specific types costing more than $200 may be sold only pursuant to rating assigned buyer by preference rating certificate or order of P-19 series.

E-6: Hand Service Tools, effective June 12. Restricts sales by producers to orders rated A-10 or higher. Limits alloy steel use in making hand tools to SAE 1300, 4000 and 9200 series; NE 8000, 8100, 8200, 8300 and 8400 series. Other grades received by a producer prior to June 12 may be used.

"L" ORDERS

L-1: Motor Trucks and Public Passenger Carriers, effective Aug. 3, 1941. All production of medium trucks for civilian use prohibited after April 30, heavy trucks after May 31, commercial trailers after June 30, 1942.

L-2: Passenger Automobiles, effective Sept. 13, 1941. Production for any purpose banned, starting Feb. 1, except operations extended to Feb. 10 to fill January quota.
L-2-i, March 9, 1942, prohibits automotive companies from selling alloy steel except on orders of A-1-k or higher rating, all other steel on A-3 or higher rating. Sales must be certified to Distressed Stocks Unit, Iron & Steel Branch, WPB.

L-3: Light Motor Trucks, effective Sept. 13, 1941. Production for any purpose banned, starting Feb. 1, except operations may continue until Feb. 10 to fill January quota.

L-4: Repair Parts for Passenger Cars and Light Trucks, effective Sept. 18, 1941 amended Jan. 22, May 5, 1942. Production quota April 1-Sept. 30 set at 70% of dollar volume sold in corresponding 1941 period. Manufacture of all but parts essential to operation of vehicle prohibited. L-4-b, April 25, 1942, restricts battery production April 1-Sept. 30 to 75% of number sold in corresponding 1941 period. Production after April 29 limited to specified sizes.

L-5: Domestic Mechanical Refrigerators, effective Sept. 30, 1941. L-5-c, effective Feb. 23, 1942, prohibits production of complete units after April 30, 1942. Amendment March 28, 1942, permits production of kerosene refrigerators.

L-6: Domestic Laundry Equipment, (washers and ironers), effective Oct. 29, 1941. L-6-c, March 14, 1942, prohibits any production after April 14 by companies making more than 60,000 units in base period, after May 14 by others.

L-7: Domestic Ice Refrigerators, effective Oct. 28, 1941. During four months ended Dec. 31, 1941, no manufacturer permitted to use more than four times 65 per cent of monthly average of steel consumed during 12 months ended June 30, 1941. Steel consumption in future quarters is limited to 60 per cent of quarterly average use during base period or during three years ended June 30, 1941. After June 30, steel use per box limited to 20 lbs.

L-11: To restrict use of chlorine in manufacture of **Pulp and Paper Board,** effective Nov. 15, 1941.

L-13: Metal Office Furniture, Equipment, effective Nov. 7, 1941. Manufacturers classified as: Class A, using 12,000 or more tons of steel the 12 months ended June 30, 1941; Class B, using 3000-12,000 tons; Class C, using less than 3000 tons. Products divided into: Group 1, essential products in which wood not a possible substitute; Group 2, both essential and nonessential products for which wooden substitutes not available; Group 3, products in which wood can be substitutes. Effective April 1, manufacture of Group 1 products banned, except for Army, Navy, Maritime Commission orders or those rated higher than A-2; steel use in making metal shelving (Group 2) limited to 50% of base period rate; steel use in April and May by Class A manufacturers in making Group 3 products and any other office furniture not mentioned in Groups 1 or 2, limited to 40% of base period rate. Making of Group 3 products banned after May 31. Manufacturers prohibited from disposing of steel stocks except on orders rated A-2 or better or on orders for RFC agencies. Amendment, June 1, exempts wood filing cabinets containing not over 2 lbs. of steel hardware per drawer.

L-18: Domestic Vacuum Cleaners, effective Nov. 27, 1941. Production banned after April 30, 1942.

L-20: Cellophane and similar Transparent Materials derived from Cellulose, effective Nov. 8, 1941, amended June 8, 1942. Bans use of material over .003-inch thick for packaging, sealing or manufacture of various products, including razor blades, textiles, hardware, metals, sporting goods, electrical equipment except manufacture thereof, pens, pencils, jewelry, clocks, canned goods, coat hangers, brake linings, paints, clay products and plastic products.

L-21: Automatic Phonographs, Weighing, Amusement and Gaming Machines, effective Dec. 10, 1941. L-21-a, March 16, 1942 prohibits production after April 30, 1942. Making spare parts for slot machines banned. Material stocks may be used to fill orders rated higher than A-2.

L-22: Warm Air Furnaces, effective April 11, 1942. Iron and steel use in 1942 by manufacturers or assemblers of 8000 or more furnaces in 1940 limited to 50% of 1940 consumption, other producers limited to 90%.

L-23: Stoves, Ranges, other domestic cooking appliances, effective Dec. 13, 1941. **L-23-c,** issued May 14, 1942, prohibits production after July 31 by manufacturers with factory sales $2,000,000 or more in year ended June 30, 1941, and by smaller makers in specified labor shortage areas. Effective May 15, small makers not in labor shortage areas permitted to make only "permitted types" and limited in iron, steel use in manufacturing stoves to 50% of base period rate, for ranges to 70%. After July 31, weight of iron and steel per stove and per coal or wood range limited to 70% of base period average. Iron, steel use to make stoves Jan. 1 to July 31 by companies required to quit production July 31 limited to six times monthly average base period rate. L-23-b, May 2, 1942, forbids disposal of electric ranges except on A-9 or higher ratings. Permits iron and steel use in May at average rate in year ended June 30, 1941. Prohibits production after June 1 except to fill orders rated A-1-k or higher. Replacement parts not affected.

L-25: To limit use of **Tin Foil and Lead-Foil,** effective Nov. 24, 1941. Revoked Jan. 15, 1942. Restrictions covered by M-43-a, 38-c.

L-26: Farm Machinery, effective Dec. 31, 1941. Restricts use of strategic materials for new farm machinery to 83 per cent of 1940 consumption and materials for repair parts to about 150 per cent of the 1940 level. Establishes quotas of types of machinery permitted to be made. L-26-a, March 9, 1942, prohibits production of farm tractors requiring rubber tires, effective May 1. Amendment to L-26, March 30, 1942, revises production quotas, increasing estimated material requirements, mostly iron and steel, by about 25,000 tons for period Nov. 1, 1941 to Oct. 31, 1942. Amendment to L-26-a, April 20, 1942, prohibits after April 30 manufacture of farm machinery and equipment requiring rubber tires. Manufacture of combines requiring tires banned after July 31, 1942.
Amendment to L-26, May 18, sets export quotas at 112% of 1940 volume, except to Canada. Specified quotas for Canada vary by product. L-26-b, May 15, limits sales of excess lots of alloy steel by farm equipment makers to orders rated A-1-k or higher, other iron or steel on A-3 or higher ratings. L-26-c, June 15, 1942, prohibits use of copper in making farm tractors, except for certain specified uses. Amendment, June 20, 1942, authorizes 33% increase in production of wooden beehives and production of belt-driven, irrigation turbine pumps (1200 g.p.m. capacity and larger) to fill orders rated A-3 or better.

L-27: Vending Machines, effective Dec. 31, 1941. L-27-a, March 17, 1942, prohibits production after April 30, 1942. Spare part manufacture limited to rate in year ended June 30, 1941.

L-28: Incandescent Lamps, effective Jan. 24, 1942. Starting Feb. 1, 1942, use of materials obtained on preference ratings prohibited in making lamps for decorative or advertising purposes, and quarterly consumption of nickel, brass, copper or other such metal cut 50 per cent below average quarterly use in 1940. In making all types of lamps, consumption of nickel cut 25 per cent, brass and copper 20 per cent, from 1940 average. Effective July 1, plated iron and steel to be substituted for copper alloy and nickel parts. Quarterly production of bases for incandescent and fluorescent lamps at 125% of 1940 rate. Production of Christmas tree, advertising and decorative lamps prohibited June 1.

L-29: Metal Signs, March 25, 1942. Met-

al use in making signs of more than 36 sq. in. limited during second quarter 1942 to 12½% of use in 12 months ended June 30, 1941. All metal use banned July 1. Signs containing less than 5% of metals by weight not affected. Iron and steel stocks may be sold only on orders rated A-3 or better, except to government agencies. Railroad and highway signs exempted June 2.

L-30: Household Utensils, March 31, 1942. During second quarter 1942, steel use to make cooking utensils cut 10% from amount of scarce materials (iron, steel, tin, aluminum, nickel, copper and alloys, chromium and lead) used in 12 months ended June 30, 1941. In making kitchen ware and essential household articles steel use cut 30%, zinc use cut 50% from base period. In making nonessential household and other miscellaneous articles, use of iron, steel, zinc cut 50%; 100% after June 30. Amendment, May 9, 1942, permits use of steel wire hook on coat hangers, use of joining hardware weighing not over 5% that of completed article. Amendment, June 12, permits unrestricted production of wooden pails and tubs if metal hoops, bails, ears and handles not over 15% of total weight.

L-31: Natural Gas, effective Feb. 16, 1942. Bans gas use for structures unless heating equipment installed or specified in construction contract and main foundation completed by March 1. Conversion from some other fuel to gas must be completed by Feb. 26, 1942. Applies to all or parts of Alabama, Arkansas, California, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Maryland, Michigan, Mississippi, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia. Amendment, April 23, 1942, extends restrictions to parts of Iowa, Kansas, Minnesota, Nebraska, Oklahoma, South Dakota.

L-32: Metallic License Plates, effective March 18, 1942. Prohibits state and local governments from issuing plates in one year in quantity more than 10% of weight of plates issued in corresponding year ending between June 30, 1941 and July 1, 1942, and then only to replace destroyed or lost plates, for new licensees or for "date tabs" not more than 4 square inches in size.

L-33: Portable Electric Lamps, Shades, effective March 23, 1942. Amended April 30, May 25. Limits production and metal consumption to 60% of 1940 rate. Nonferrous metal use permitted only for sockets, switches, plugs and lamp cords.

L-35: Spare Parts for medium and heavy trucks, truck trailer, passenger carriers, effective Jan. 22, 1942. Limits production in 1942 first quarter to 60 per cent of number sold for replacement purposes in second half of 1941. Amendment March 6 raises quota for first half of 1942 to 75 per cent of 1941 period; three quarters to 112½ per cent; 12 months to 150 per cent.

L-37: Musical Instruments, effective Feb. 17, 1942. L-37-a, May 29, prohibits processing critical materials starting June 1. Assembly permitted for one month (two months for pianos and organs) at rate allowed preceding three months under L-37. Permits production of instruments containing not over 10% of critical materials at rate of 75% of critical material use in 1940. Repair part production limited to 75% of 1940 rate.

L-38: Air Conditioning, Commercial Refrigeration, effective May 15, 1942. Prohibits installations of new equipment except for Army, Navy, Maritime Commission, certain other government agencies. Lend-Lease and orders rated A-9 or higher issued for specific type of equipment. Subsequent manufacturing limited to number of items delivered on preferred orders in preceding period or to number of unfilled orders. Manufacture of beverag dispensers and coolers, room coolers, soda fountains, quick-freeze refrigerators permitted for 90 days only for Army, Navy, Maritime Commission. Amendment, June 18, 1942, permits sale of certain equipment without rating to cover installation of finished product. Excludes repair parts from order provisions. Appeals for relief from order files on PD-520.

L-39: Fire Protective Equipment, effective Feb. 24, 1942. Includes fire extinguishers, sprinkler systems, fire hydrants and fittings, hose racks and dryers, lightning rods. Specifies products for which strategic materials may be used. Limits quarterly production of foam and anti-freeze extinguishers to quarterly average for year ended Nov. 30, 1941, except to fill government or lend-lease orders. Assembly of parts already fabricated Feb. 24 is permitted to fill defense orders with A-2 or higher rating, except 2½-in. brass fire hose couplings on hand April 27.

L-41: Construction, effective April 9, 1942. Bans new construction, remodeling or rehabilitation, not including maintenance or repair, with following exceptions: For specified government agencies identified with the war effort; for activities used directly in discovery, development or depletion of mineral deposits; construction subject to Order M-68; residential construction costing less than $500 or restoration from fire, damage by nature or the enemy after Dec. 31, 1941; agricultural construction costing less than $1000; construction authorized by OPM or WPB; other construction, including public works, costing less than $5000. Existing restrictions on various material uses remain in effect. When priorities assistance not required, application for authority to begin construction made on PD-200 and PD-200A. L-41-a, May 23, 1942, stops work of $5000 or more on public amusement projects, except playgrounds and temporary structures.

L-42: Plumbing and Heating Products, effective Feb. 11, 1942. Simplifies various items manufactured by plumbing and heating industry. Schedule I establishes pressure ratings for iron, brass and bronze valves. After Feb. 28 all valves produced or sold (except those in stock) must conform to standards established.

Schedule II, effective March 1, 1942, establishes sizes and standards for gray cast and malleable iron, brass and bronze pipe fittings permitted to be produced or sold. Exempts finished fittings on hand March 1, also certain types used in shipbuilding.

Schedule III, issued March 7, 1942, eliminates metal jackets, fusible plugs and tricocks from low pressure heating boilers after June 1, 1942, unless units were in stock on that date. Stops production of metal jackets March 16, 1942.

Schedule IV, effective April 1, 1942, directs discontinuance of manufacture of medium soil pipe reduction in weight of extra heavy soil pipe, elimination of use of brass pipe plugs and brass-trap screws with soil pipe fittings. Amended June 1, 1942, to confine production to type between "standard" and "medium".

Schedule V, effective April 1, 1942, lists specific plumbing fixtures which may be made of copper, copper-base alloy or die-cast zinc.

Schedule VI, April 16, 1942, establishes types and sizes for tubular radiators, eliminating production of larger units.

Schedule VII, effective April 1, 1942, restricts copper and copper alloy use in hot water heaters and piping systems.

Schedule V-a, effective June 15, 1942, prohibits use of copper or its alloys in making: Bath tub fillers and nozzles; shower fittings; lavatory compression faucets; lavatory combination faucets; sink compression faucets; combination sink and laundry tub faucets and spouts; laundry tray faucets; outlet plugs and strainers; tail pieces; flush ells; flush valves for closet tanks. Use permitted for certain component parts, such as valves, except for last four items.

Schedule VIII establishes specifications for low pressure thermostatic radiator traps, float and thermostatic traps, boiler return traps, strainer and supply valves, effective June 15.

Schedule IX limits sizes of gas water heater storage tanks to 20, 30 and 40-gallon sizes, effective May 15. Bans use of copper or copper alloys, eliminates metal jackets.

Schedule X, June 16, prohibits production of electric sump pumps and cellar drainers except in accordance with stated specifications. Schedule XII, June 20, bans manufacture of various bath and wash room items, other than those conforming to defined specifications covering metal use.

L-43: Motorized Fire Apparatus, effective Feb. 2, 1942. Eliminates use of fire bells, aluminum, copper, nickel, chromium, cadmium, tin, zinc, steel, synthetic rubbers, except for limited use in specific list of products. Manufacture of motorized apparatus prohibited except to fill defense orders. Sizes of fire engine pumps standardized.

L-44: Radio Receivers, Phonographs, effective Jan. 23, 1942. L-44-a, March 7, 1942, prohibits production after April 22, 1942. Use of more than $500 worth of materials, other than wooden cabinets, ordered after Feb. 11, 1942, banned. Replacement parts not affected.

L-46: Electric Power, effective Feb. 27, 1942. Provides for integration of generating systems by utilities and industries and curtailment of consumption of Niagara frontier area in event of power shortage.

L-48: Light Aircraft, effective Feb. 17, 1942. Covers new planes built after Sept. 30, 1941, flown less than 100 hours and using engines of less than 500 horsepower. Sales, other than to government agencies and Allied nations, prohibited, unless approved by Director of Industry Operations. Prohibits start of manufacture of light planes if ribs are aluminum and airframe contains more than 18% aluminum, or if ribs are other material and airframe has more than 12% aluminum. After Sept. 1, 1942, manufacture limited to planes with airframe content of 12% aluminum, regardless of rib material.

L-49: Beds, Springs, Mattresses, effective March 20, 1942. Requires manufacturers consuming 500 tons or more of steel in year ended June 30, 1941, to cut use in second quarter 35% to 60%, depending on product. Users of 100 to 500 tons cut 25% to 50%. Others cut 15% to 40%. Amendment, June 8, 1942 prohibits production after Sept. 1 of mattresses containing iron or steel. July and August wire use limited to rate in base period.

L-50: Telephone Industry, effective March 2, 1942. Limits changes in equipment

and facilities of telephone companies. Bans conversion of manual offices, replacement of existing instruments of users unless beyond repair, installation of extension phones in residences.

L-51: Anti-Freeze, effective May 14. Places production on quota basis. Quotas expected to approximate 50% of 1941 sales.

L-52: Bicycles and Parts, effective March 12, 1942. Output of juvenile models prohibited after April 1. No models may weigh more than 31 pounds. Output April 1 to June 30 limited to 42 per cent of 1941 average monthly rate. Metals used in manufacture limited generally to iron, unalloyed steel, silver and gold. L-52-a, effective April 2, 1942, prohibits sales of new adult bicycles, pending start of rationing.

L-53: Track-laying Tractors, effective Feb. 19, 1942. Includes bulldozers, power control units, winches, etc. Prohibits producers and distributors from selling unused tractors or equipment, except against orders received prior to Feb. 19 and carrying rating higher than A-2, L-53-a, April 9, 1942, bans production of 17-35 horsepower tractors Sept. 1. Meanwhile Allis-Chalmers and Caterpillar may build 1000 each, International Harvester 600, Cleveland Tractor 435. Amendment, June 15, prohibits sale, lease or delivery except on specific release issued before June 15.

L-54: Typewriters, effective March 6, 1942. Prohibits delivery of new and used units, except for repairs, pending OPA rationing. L-54-a, March 17, amended May 30, 1942, cuts standard model production by five largest makers from March 15 to July 31, 25% below 1941 factory sales rate. Woodstock cut 10%. Production of portable models cut 64% through May 31, 89% in June and July. Makers must earmark stocks and portion of output for Army and Navy, balance to be distributed under WPB instructions. July parts production of standard models for export cut 47% from 1941 for major companies; 25% for Woodstock; 89% for portables.

L-54-b: Office Machinery, March 15, 1942. L-54-c June 1, revoking L-54-b, restricts production through remainder of year to permit stockpile accumulation to accommodate needs of essential users until June 30, 1944. Production quotas fixed for each type machine. Also regulates distribution.

L-55: Shotguns, effective Feb. 23, 1942. Prohibits delivery of 12-gauge guns except to agencies and officers of federal, state and local governments and for lend-lease. Limits shotgun production in other than 12-gauge size to one-half average 1940 rate. Prohibits use of machinery suitable for making 12-gauge guns in turning out shotguns of other sizes.

L-57: Gas Masks and Anti-Gas Devices, effective March 3, 1942. Prohibits manufacture or sale of such items for protection against enemy attack, unless ordered by government agency and built to Army Chemical Warfare Service specifications.

L-58: Sextants, effective March 11, 1942. Prohibits sales except to government agencies, to buyers who have obtained a certificate from the Coast Guard, and to dealers. Imports from Great Britain prohibited unless approved by Lend-Lease Administration.

L-59: Metal Plastering Bases, effective March 25, 1942. Producers who used 14,000 tons or more of metals in 1941 required to cut metal consumption 50% below 1940-41 average rate. Zinc use cut 65%. Smaller producers cut all metal use 25%, zinc 50%. Covers accessories as well as lath, etc.

L-60: Pistols, Rifles, Shotguns, effective Feb. 27, 1942. Prohibits disposition of new guns, except sales to federal, state, local and Allied governments and for Lend-Lease. Certain types released May 26.

L-61: Rubber Machinery, effective March 11, 1942. Prohibits manufacture or sale of equipment used to retread or recap rubber tires except on orders rated by Director of Industry Operations on PD-1A. Does not apply to repair parts.

L-62: Metal Household Furniture, effective March 20, 1942. Covers items with more than 5% metal content by weight (other than nails, other joining hardware). All production banned after May 31. Amendment, May 14, 1942, permits until June 30 assembly of parts so processed as to be worthless for other purposes.

L-63: Suppliers' Inventories, effective April 6, 1942, revoking M-67. Covers wholesalers, distributors, jobbers, dealers and retailers furnishing automotive, aviation, builders, construction, dairy, electrical, farm, foundry, grain elevator, hardware, health, industrial, plumbing and heating, railroad refrigeration, restaurant, textile mill, transmission, welding and cutting supplies from stock. Limits inventories in eastern and central time zones to twice dollar value of stock shipments in second preceding month; in other zones to 100% of stock shipments two months earlier. Permits acquisition of seasonal lines equal to purchases in peak season of not over 90 days in previous year. Suppliers must record inventories and sales on PD-336 for WPB inspection. Exempted are suppliers with total inventory of less than $20,000 or with inventory of each type of supplies of less than $10,000. Steel warehouses exempted from filing monthly reports. Amendment, May 4, exempts supplies made of aluminum from order provisions. Amendment, May 5, permits stock additions of specific items in amount equal to sales preceding month, despite excessive total inventory. Amendment, May 23, permits basing inventories on sales in preceding quarter, rather than second preceding month. Amendment, June 15, removes control over railroad supplies. Amendment, June 23, removes control over various non-critical building materials.

L-64: Burial Equipment, March 28, 1942. Iron and steel use in making caskets, shipping cases and burial vaults cut 25% in April, 50% in May, 75% in June from average 1940 rate. All use of other metals, except gold and silver, banned immediately; iron and steel use permitted after June 30 only for hardware and metal liners.

L-65: Domestic Electrical Appliances, March 30, 1942. Production after May 31 limited to orders rated A-2 or better. Nickel not permitted for plating after March 31, 1942. Making of replacement parts not restricted. Use of electrical resistance material limited to parts in stock and to 15% of 1941 consumption.

L-67: Lawn Mowers, effective March 30, 1942. Second quarter use of iron and steel in making mowers, except for cutting crops, limited to 50% of amount used in corresponding 1941 period or 50% of average 1941 quarterly use. Full 1941 rate permitted if fabricated material in maker's possession before March 31 used. Production banned after June 30, 1942.

L-68: Garment Closures, Associated Items, effective April 1, 1942. Limits use of steel, zinc or zinc alloy in making slide fasteners or parts to 50% of rate for year ended June 30, 1941. Bans use of copper or copper alloy and restricts length of slide fasteners to 10 inches, except for trousers (may be 12 inches) and work jackets (may be 20 inches). Prohibits manufacture or delivery of slide fasteners made of steel, zinc, copper or their alloys for use on any of 32 specified articles. Bans copper use in making hooks, eyes, snap fasteners, buttons and other types of closures and restricts use of steel and zinc except in filling government orders.

L-69: Bright Work on Vehicles, effective March 14, 1942. Prohibits use of bright work on all types of motor vehicles and trailers, including replacement parts and accessories other than ventilator window latches, external locks, cylinder caps and covers, windshield wipers and body trim screws.

L-71: Flashlights, effective April 1, amended June 5, 1942. Bans use of aluminum, chromium or nickel in making cases or batteries. Tin may be used only in solder, iron and steel only in reflectors, contact fittings, battery top seals, battery outer jackets, rivets, end caps and end ferrules. Steel plated and in stock by March 31 may be used.

L-72: Razors and Blades, effective March 25, 1942. Safety razor production ensuing 90 days limited to 70% of 1940 average rate, blades and straight razors to 100% of 1940 rate. Copper consumption in making safety razors ensuing 60 days restricted to 30% of 1940 rate, thereafter to plating only, not over .0004-inch thick.

L-73: Metal Office Supplies, March 28, 1942. Except for wire staples, iron and steel use cut 20% to 50% from rate in 1940. Use of any copper, tin, nickel, chromium, cadmium or crude rubber prohibited unless processing started. Zinc use limited to galvanizing necessary for practicable use. Manufacturers must follow federal specifications issued by Director of Procurement.

L-74: Oil Burners, effective April 15, 1942. Production of burners capable of using more than 15 gallons of oil per hour limited to orders rated A-10 or better. Output of smaller burners in April and May limited to one-twelfth 1941 production, banned completely after May 31. Amendment, June 4, excepts burners used on shipboard, or for cooking or heat treating, sold on orders rated A-10 or higher.

L-75: Coal Stokers, effective April 15, 1942. Production of stokers capable of feeding more than 60 pounds of coal per hour limited to orders rated A-10 or better. Output of smaller stokers in April and May limited to one-twelfth 1941 production, banned completely after May 31, except assembly until Sept. 30 of fabricated parts in makers' possession May 31.

L-77: Metal Windows, effective March 25, 1942. Restricts production of metal window framework to orders with rating better than A-2, unless manufacture started before March 25. Sales limited to orders with A-10 or better rating. Amendment, April 28, 1942, permits manufacture of basement and residential casement windows made of materials in stock prior to March 25 for use in rated housing projects. Material deliveries must be made under P-90.

L-78: Fluorescent Lighting Fixtures, effective April 2, amended April 23, 1942. Prohibits manufacture or assembly of fixtures or parts except from material acquired on PD-25A or A-2 preference

rating and in makers possession April 20 through order placed before April 3. After May 15, production of fixtures for lamp of more than 30 watts limited to orders rated A-2 or higher. Effective June 1, sales other than repair parts, limited to orders rated A-2 or better and fixtures for lamps of less than 30 watts; 30 watts or less, effective June 13.

L-79: Plumbing, Heating Equipment, effective April 16, amended May 23. Permits shipment until June 30 of equipment against orders received no later than April 16. Permits delivery of equipment until July 31 for completion of projects started between Aug. 1, 1941 through April 9, 1942; equipment on A-10 or better rating; items costing no more than $5 if part of an order totaling no more than $10; oil burning furnaces replacing other similar equipment and installed for the purpose of reducing fuel oil consumption; cooking and heating stoves and water heaters if no other equipment for these purposes available.

L-80: Outboard Motors, March 27, 1942. Halts production except for specified government agencies. Spare parts output limited to 75% of 1941 rate. Manufacturers' stocks of motors of 6 horsepower and more frozen for disposal to government.

L-81: Toys and Games, April 1, 1942. During second quarter 1942, in making items containing by weight more than 7% of iron, steel, zinc or rayon, consumption of such materials limited to 25% of average quarterly use in 1941. All use banned after June 30, 1942. Effective immediately no "Prohibited Materials", including alloy steels, chromium plating, copper, silk and various other materials, may be used if in raw form to make toys or games.

L-82: Construction Equipmnt, effective May 2, 1942. Prohibits lease or disposal of new power cranes and shovels without authorization of Director of Industry Operations. PD-448 used to seek release. Production after June 1 must be approved by Director. Production schedules filed on PD-446. L-82-a, May 2, prohibits lease or disposal of rubber-tired construction equipment without authorization requested on PD-448, except for previous orders rated higher than A-2 and on which shipments must be made before June 2.

L-83: Industrial Machinery, effective May 15, 1942. Prohibits filling orders for certain types of new or used machinery, except for specified government agencies, United Nations, Lend-Lease or on A-9 or higher rating issued on original PD-1, PD-1A or P-19-h certificate or on PD-3 or PD-3A certificate countersigned before April 9. Exempts certain orders involving less than $200 and parts worth less than $1000. Parts costing more than $1000 not restricted in event of actual breakdown of machinery. Amendment, May 18, 1942, extends restrictions to additional machinery, permits production for stock without authorization.

L-84: Electric Heating Pads, effective April 4, 1942. Limits 1942 production to 50% of 1940 output, hospital type to 100%. Permits rubber use in pad only in latter type. Prohibits use of chromium and resistance material containing more than 50% nickel. Limits use of resistance material per unit to 1940 rate. Amendment April 15, 1942, bans all production after June 30, 1942, except to consume processed material in stock April 4.

L-86: Liquefied Petroleum Gas Equipment, effective April 8, 1942. Prohibits installations with following exceptions: Material for maintenance or repair of existing equipment; installations started prior to Jan. 14, 1942, and completed by May 15, 1942; installations in use prior to April 1, 1942, and subsequently withdrawn from use; containers exchanged in normal course of distribution; installations authorized by WPB. Application for such authority made on PD-397.

L-88: Used Rails and Joints, effective April 22, 1942. Prohibits disposition of used rails (35-132 lbs.) unless authorized by Director of Industry Operations. New rails may be received only to extent of used rail footage made available for use as ordered by the Director in following amounts: 15% within 30 days of new replacement rail receipt; 15% additional in 60 days; 20% additional in 90 days; 40% in 150 days. Amendment, May 18, permits disposal without authorization of not over 10 tons of rails monthly.

L-91: Laundry Equipment (commercial), effective April 18, 1942. Bans manufacture after June 1 and of dry cleaning equipment after July 1, except for Army, Navy, Maritime Commission orders. Freezes existing equipment and stocks acquired prior to deadlines. Amendment, June 3, permits assembly of completely fabricated parts after deadlines, if delivery approved by Director of Industry Operations.

L-92: Fishing Tackle, effective April 23, 1942. Prohibits use of metals, plastics and cork in making non-commercial tackle after May 31, 1942, except fish hooks, which may be made at 50% of 1941 rate.

L-93: Golf Clubs, effective April 9, 1942. Prohibits use of iron, steel, other critical metals, plastics and cork in making golf clubs after May 31. Meanwhile iron and steel use limited to 50% of 1941 average consumption, use of other critical metals, plastics, cork banned April 9. Assembly of parts fabricated before April 9 permitted until June 30.

L-97: Railroad Locomotives, effective April 4, 1942. Freezes finished units in producers' hands and prohibits production except in accordance with schedules issued by WPB, L-97-a, April 4, applies same regulations to railroad cars. L-97-a-1, April 29, cancels A-2 or lower ratings on material for freight car construction. Builders may sell any material to other builders.

L-97-a-1 (Amendment): **Freight Cars,** effective May 28. Permits sale of equipment used to build or repair cars between producers or suppliers of materials, regardless of restrictions under M-21 on iron and steel deliveries.

L-98: Domestic Sewing Machines, effective April 25, 1942. Bans production after June 15, 1942. Output meanwhile restricted to 75% of 1940 rate. Repair parts manufacture during six months after May 1 permitted at 125% of average 1940-41 rate.

L-100: Compressors, effective April 17, 1942. All new, used and reconditioned heavy compressors placed under allocation. Manufacturers prohibited from accepting orders unless authorized on PD-420. PD-415 is application for authority to place order, PD-416 application for permission to make delivery.

L-102: Used Generators and Steam Boilers, effective April 11, 1942. Prohibits sale, lease or option of used electric generating equipment or used steam boilers without authorization from Director of Industry Operations, unless value is less than $1000.

L-103: Glass Containers, effective May 11, 1942. Prohibits manufacture not conforming to specified standards.

L-104: Metal Hairpins and Bob Pins, effective April 25, 1942. Production next 90 days limited to 50% of 1941 average rate. Only low carbon steel wire of gage less than .035-in. may be acquired for making these products. Hairpins may be sold only in packages containing less than 100 pins.

L-105: Helmets, effective April 29, 1942. Bans production and sale of helmets for civilian use during air raids, except on order by government agency or other United Nation. Amendment, June 5, permits assembly and sale of helmets in process or completed April 29.

L-106: Copper Use in Motor Vehicles, effective May 5, 1942. Prohibits use of copper or copper alloys in making all but essential operating parts.

L-107: Extended-Surface Heating Equipment, effective June 13, 1942. Includes unit heaters, unit ventilators, blast heating coils, convectors and winter air conditioners. Prohibits delivery, except to Army, Navy, Maritime Commission or Coast Guard, unless authorized on PD-412a by Director of Industry Operations. Suppliers file PD-467 with WPB by 15th each month to report preceding month's deliveries.

L-108: Finishes of Metalworking Equipment, effective April 27, 1942. Finishes applied after April 30 limited to one coat of primer or sealer; no filler; two coats of paint, enamel or lacquer of "old machine-tool gray."

L-110: Electroplating and Anodizing Equipment, effective May 11, 1942. Limits sales to A-1-j or higher ratings.

L-111: Hand Trucks, effective May 7, 1942. Prohibits manufacture of rubber-tired trucks, except for sale to certain industries.

L-113: Pencils, effective May 2, 1942. Bans use of all metals except iron or steel in manufacturer's inventory in making wood-cased pencils. Finishing material use limited to 1 gallon per 100 gross of pencils.

L-114: Safety Equipment, effective May 5, 1942. Use of scarce material banned, except on orders rated A-2 or higher if made from parts manufactured prior to May 5, or for certain specified parts, or within 90 days of May 5 for delivery to Army, Navy, Maritime Commission.

L-117: Heavy Power & Steam Equipment, effective May 18, 1942. Limits sales and deliveries to government and Lend-Lease orders, orders rated A-9 or higher assigned by PD-3 or 3A countersigned prior to May 18, or by PD-1 or 1A or P-19h order issued at any time. Affects other than marine units. Amendment, June 8, permits deliveries on A-9 or higher ratings assigned by PD-2, PD-4, PD-5, P-5b, PD-25A.

L-121: Construction Lumber, effective May 13, 1942. Prohibits sales and deliveries by large producers for 60 days, except to Army, Navy, Maritime Commission.

L-123: Industrial Equipment, effective May 26, 1942. Restricts sales and deliveries to orders rated A-9 or higher. Exempts repair parts of less than $1000 for one piece of equipment or parts worth more than $1000 in case of breakdown. Covers conveying machinery, mechanical power transmission equipment, industrial fans and blowers, turbo blowers, industrial compressors and pumps, elctric motors 1 horsepower and over, industrial hand trucks, stationary steam engines except marine and generator sets, industrial air washers and heat exchangers, passenger or freight ele-

vators, electric controls for motors 1 horsepower and over.

L-128: Automotive Exhaust Valves, effective July 1, 1942. Permits use of chromium and nickel only in valve head. Prohibits sale unless consumer turns in used valve which cannot be reconditioned. Valves made under specifications for medium and heavy trucks may not be used in passenger cars or light trucks. Order does not apply to orders placed within 90 days after July 1 by Army, Navy or Maritime Commission.

L-134: Instruments, Valves and Regulators, effective May 26. Establishes specifications for 28 specific items forming component parts of industrial processing instruments, valves and regulators. Limits use of instruments containing chromium and nickel to certain operating conditions. Prohibits deliveries against orders rated below A-10. Restricts manufacturing and deliveries in accordance with specified uses. Exempts instruments containing no nickel or chromium, or instruments made before May 26.

L-136: Church Goods, effective June 23, 1942. Bans production or assembly of church goods containing specified critical materials. Starting June 1, iron and steel use limited to 50% of amount of iron, steel and critical material used in corresponding 1940 period.

L-140: Cutlery, effective June 1, 1942. Iron and steel use limited to following percentages of rate for year ended June 30, 1941: 100% in making industrial food processing instruments; 60% for cutlery used in homes, shops, hotels, etc., to prepare food; 35% for cutlery used in serving and eating food, and ordinary scissors; 100% for unessential cutlery until June 30, nothing thereafter.

L-144: Laboratory Equipment, effective June 12, 1942. Prohibits sale or delivery of equipment containing critical material except for certified essential uses.

L-145: Aircraft Bearings, effective June 9, 1942. Restricts production of control and pulley bearihgs to certain specified makers.

L-146: Welding Rods, Electrodes, effective June 13. Restricts deliveries, other than to Army, Navy, specified government agencies, Lend-Lease and accredited schools, to orders rated A-9 or higher. Alloy electrodes and rods require A-1-j or higher rating. Use by schools limited. Producers may deliver for repair and maintenance use no more than 6% of total monthly shipments. Stocks of users limited to 60-day supply. Producers report shipments to WPB by 18th each month on PD-528.

L-150: Douglas Fir Plywood, effective July 1, 1942. Prohibits production or delivery after July 1 of types and sizes other than those listed in order.

L-152: Baby Carriages, issued June 13, 1942. Limits production through July 31 to rate during year ended June 30, 1941. After July 31, metal use limited to iron, steel, gold and silver. Iron and steel use per carriage restricted until Nov. 1 to 6 lbs., not including hardware; to 6 lbs., including hardware, after Nov. 1. Iron and steel use per stroller restricted Aug. 1 until Nov. 1 to 3 lbs., not including hardware; to 3 lbs., including hardware, after Nov. 1. Iron and steel use per baby walker restricted to hardware, starting Aug. 1. Production of carriages and strollers after July 31 limited to rate during year ended June 30, 1941.

L-154: Power, Steam and Water Auxiliary Equipment, effective June 17, 1942. Schedule I bans use of stainless steel or nickel alloys in manufacture of water meters. Copper and its alloys eliminated from all parts except internal gears and workings. Tin use prohibited except as alloy in copper.

PRIORITIES REGULATIONS

Priorities Regulation No. 1. Defense orders must be accepted unless impossible because of previous defense orders, or if buyer will not conform to established prices, or if orders specify delivery within 15 days and such delivery would require termination before completion of an existing production schedule. Delivery under defense orders must be made before other orders, but no earlier delivery date shall be specified in any defense order than required by the schedule of the person placing the order. Material obtained under allocation or preference rating may be used only for the purpose specified. Inventories must not be increased beyond current needs. Records must be kept for not less than two years of inventories of material covered by preference orders and details of all transactions in such materials. Records are subject to inspection by WPB. Effective Aug. 27, 1941. Amendment effective Dec. 23, 1941, requires acceptance of B rated orders before unrated orders. Inventory restrictions tightened further. All defense orders not otherwise rated take A-10 rating.

Priorities Regulation No. 2, effective Sept. 9, 1941. Makes all preference ratings mandatory and legally enforceable. Validates rating assignments when stamped by Priorities Director on face of application.

Priorities Regulation No. 3, effective Feb. 2, 1942, amended Feb. 25, July 1, 1942. Permits application or extension of any preference rating by use of following certification: "The undersigned purchaser hereby represents to the seller and to the War Production Board that he is entitled to apply or extend the preference ratings indicated opposite the items shown on this purchase order, and that such application or extension is in accordance with Priorities Regulation No. 3 as amended, with the terms of which the undersigned is familiar." Rescinds provisions of existing orders requiring buyer to furnish copies of rating orders or other special certifications, except for provisions of Priorities Regulation No. 9. Rating extensions in most cases restricted to material delivered to, or incorporated in a product delivered to, the person to whom rating originally assigned, or which will be used to replace in inventory materials so delivered, provided inventory held to practicable working minimum. Highest rating permitted to restore inventory material is A-1-b.

Priorities Regulation No. 4, effective Jan. 26, 1942. Validates all preference rating certificates issued by Division of Priorities, OPM, to continue effective until expiration or until cancelled by Director of Industry Operations, WPB.

Priorities Regulation No. 5, effective Feb. 5, 1942. Reproduction of all priority forms and orders permitted, with following exceptions: PD-1-c, PD-3, PD-3A, P-25-a through P-25-e, P-26-a through P-26-e, and P-35 may be reproduced only for purposes of information and marked "Specimen Copy" P-3, P-4, P-9-a through P-9-g, P-13, P-15, and P-52 may be reproduced only by or for producers (not suppliers) operating under said orders. Reproduction of P-41 limited to persons to apply the rating.

Priorities Regulation No. 6, effective Feb. 11, 1942. Abolishes Priorities Critical List of Army and Navy Munitions Board as limitation upon application of ratings assigned by various preference orders.

Priorities Regulation No. 7, Feb. 17, 1942. Permits use of facsimile signature when assignment or extension of preference ratings requires endorsement on purchase orders.

Priorities Regulation No. 8, March 16, 1942, discontinues reports on various PD forms.

Priorities Regulation No. 9, effective April 25, 1942. Governs issue and use of ratings for exports. Ratings assigned may not be applied without export license or other authorization to export. PD-1A used to apply for ratings until forms approved for each type of export product. PD-311 used for petroleum products exports.

Priorities Regulation No. 10, issued June 1, 1942. Provides for establishment of Allocation Classification System, consisting of symbols designating type of purchaser and end use of products included in orders on which symbols indicated. Such symbols required on all purchase orders or contracts placed after June 30 and those calling for delivery after July 31, 1942. Does not apply to retail purchases, purchases by retailers or purchases by distributors for resale to retailers. Industrial and mill suppliers, warehouses and similar industrial businesses affected by this regulation.

Priorities Regulation No. 11, issued June 10, 1942. Requires adoption of Production Requirements Plan (See P-90) by all companies, plants or divisions of a company maintaining a separate inventory whose past or anticipated quarterly receipts or withdrawals from inventory of specified metals aggregate $5000 or more. Such metals include all of the commoner forms of ferrous and nonferrous materials. Such companies required to file a PRP application on PD-25A not later than June 30, 1942.
Excepted are: United States or other government agencies (not including those engaged in manufacture, such as shipyards, arsenals, prison factories, etc., which are subject to the requirements); companies or persons engaged in: transportation; furnishing heat, light, power, electricity, gas or water; mining or quarrying; production, refining, transportation, distribution or marketing of petroleum or associated hydrocarbons; communications; sewerage or drainage; wholesaling, retailing, warehousing, or other similar operations which do not involve manufacture or processing of materials; extracting, smelting, refining, alloying, or processing metal ores or scrap into raw metal; construction.
Amendment, June 19, 1942, exempts from regulation metal mills which do not buy more than $5000 worth of metal quarterly for maintenance, repair or operating supplies.

Priorities Regulation No. 12, issued June 26, 1942. Provides for rerating war orders and application of new series of ratings—AAA, AA-1, AA-2, etc., all of which take preference over A-1-a. AA rating abolished, all such ratings being changed to AA-2. PD-4X is form used by government agency to rerate deliveries of war materials to be made directly to it; PD-4Y is Rerating Certificate used by manufacturer to rerate deliveries to be made to him, after his deliveries are rerated by war agency.

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PRICE SCHEDULES AND REGULATIONS

Issued by the Office of Price Administration, Temporary Building "D"
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General Maximum Price Regulation, issued April 28, 1942, by OPA, with a few exceptions establishes ceiling quotations for manufacturers, wholesalers and retailers for commodities and services not covered by the following separate schedules. The general regulation fixes the highest levels charged during March, 1942, as ceiling prices, these taking effect May 18 for products sold at retail, May 11 for manufacturers' and wholesalers' prices and July 1 for services sold at retail. Exemptions include waste materials up to the level of the industrial consumer; zinc, lead and tin industrial residues; antimony ore and concentrates; certain machines and parts made by subcontractors.

July 1 is effective date of ceilings for sales to War and Navy Departments. Supplementary regulation, effective May 18, excludes from general regulation sales of armament to the government, noncombatant ships and boats, goods produced under certain government contracts, items required in an emergency and Brazilian rock quartz crystals.

No. 1—Second-hand machine tools issued Feb. 17, 1941, effective March 1, 1941; amended Sept. 24, 1941. Maximum prices in terms of percentage of March, 1941 equivalent of new tools: Constructed before Jan. 1, 1920, rebuilt 70%, others 50%; Jan. 1, 1920-Dec. 31, 1929, rebuilt 80%, others 60%; Jan 1, 1930-Dec. 31, 1935, rebuilt 90% others 70%; Jan. 1, 1936 and after, rebuilt 95%, others 75%.

No. 2—Secondary aluminum and scrap, effective March 24, 1941; amended June 3, Aug. 14 and Nov. 1, 1941; correction May 5, 1941. Amended, effective Jan. 13, 1942, covering segregated plant scrap. Amended Feb. 26, 1942, to exempt from the schedule excessive inventories of aluminum products purchased by Metals Reserve Co.

Secondary ingot, cents per lb. lots of 30,000 lbs. or more, f.o.b. shipping point: 98 per cent pure and silicon alloys 15.00; No. 12 and piston alloys 14.50; deoxidizer 13.50. Add ½-cent for 10,000-30,000 lbs.; ⅛-cent 1000-10,000 lbs.; 1 cent under 1000 lbs.

Scrap, in cents per lb., f.o.b. point of shipment, for lots less than 1000 lbs., 1000-20,000 lbs. and 20,000 lbs. or over, respectively: Plant Scrap—segregated 2S clips or other 2S solids, 10.00, 11.00, 11.50; mixed clips or other mixed solids, 8.50, 9.50, 10.00; segregated borings and turnings, 7.50, 8.50, 9.00; mixed borings and turnings, 6.50, 7.50, 8.00. Obsolete Scrap—pure cable, 10.00, 11.00, 11.50; old sheet and utensils, 9.50, 10.50, 11.00; old castings and forgings, 10.00, 10.50, 11.00; pistons free of struts, 10.00, 10.50, 11.00; deduct 2 cents for pistons with struts.

Note: Above 1000 to 20,000-lb. prices apply on truck shipments or 1000-lb. to minimum carload rail shipments. Prices for 20,000 lbs. or more apply when shipped by truck, or minimum carload by rail.

No. 3—Secondary zinc and scrap, effective March 31, 1941; amended Oct. 17, 1941, Feb. 2, 1942. Secondary zinc, cents per lb., carlots, E. St. Louis: 8.25, for prime western and poorer grades, 8.35 for selected, 8.50 for brass special, 8.75 for intermediate and higher. Producers quantity extras: 0.15c for 20,000 lbs. to carload; 0.25c for 10,000-20,000 lbs.; 0.40c for 2000-10,000. Other sellers' extras 0.65c, 0.75c, 1.00c and 1.50c respectively. New zinc clippings and trimmings (cents per lb.) 7.25, engravers and lithographers' plates 7.25; old zinc 5.75, f.o.b. point of shipment; add ½-cent for single shipments of 10,000 pounds or more. Unsweated zinc dross 5.80; die cast slab 5.80, scrap 4.50, f.o.b. point of shipment; add ½-cent for single shipments of 20,000 pounds or more. "Single shipment" means deliveries within 48 consecutive hours. Grades may be combined.

No. 4—Iron and steel scrap, effective April 3, 1941; amended May 7, June 18, June 21, Sept. 5, Sept. 22, Sept. 26, Oct. 10, Nov. 24, Dec. 23, 1941, Feb. 2, 10, March 18, 31, April 28, June 17, 1942.

The maximum price at which any grade of scrap (other than railroad) may be delivered to a consumer wherever located is the shipping point price plus actual transportation charges. Where shipment is by water, dock charges are 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere.

With certain stated exceptions the maximum delivered price shall not exceed by $1 a ton the nearest maximum base price in terms of transportation charges. For instance, Youngstown consumers can draw on the Cleveland area for No. 1 steel scrap by taking the Cleveland base of $19.50, subtracting the Cleveland switching charge of 65 cents and adding freight to Youngstown of $2.08. The resulting delivered figure of $20.93 is within the $1 "springboard" limit over the Youngstown base of $20. "Springboard" limit may be exceeded by amount of freight rate increase March 18, 1942.

A shipping point is the point from which the scrap is to be shipped to a consumer. The maximum shipping point price is found by taking most favorable basing point and subtracting the lowest transportation charge. Where scrap is shipped from a basing point, the shipping point price is determined by taking the basing point price and deducting local transportation costs to consumers located within the basing point. Maximum shipping point price for No. 1 steel at Boston $15.05, at New York or Brooklyn $15.33. Minimum shipping point price anywhere is $13, except specified Gulf ports where minimum is $14. Maximum freight on any scrap shipped from New England $6.65 a ton.

Brokers allowed 50-cent commission above maximum prices to consumers. No commission payable for preparation of scrap.

Base prices on open hearth grades $20, delivered consumers' plants at Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Weirton, Steubenville, Youngstown, Warren, Canton, Sharon; $18.75 Chicago, Coatesville, Claymont, Conshohocken, Phoenixville, Harrisburg, Sparrows Point; $19.50 Cleveland, Cincinnati, Ashland, Ky., Portsmouth, O., Middletown, O.; $18.25 Kokomo, Ind., Bethlehem, Pa.; $18 Duluth; $17.85 Detroit; $17 Atlanta, Alabama City, Birmingham; $16.50 Minnequa, Col.; $17, Los Angeles, San Francisco, Pittsburg, Calif.; $14.50 Seattle. For No. 1 railroad heavy melting steel add $1 to above prices at centers which are basing points for railroad grades.

No. 1 cupola cast $18 at shipping points in Montana, Idaho, Wyoming, Nevada, Utah, Arizona, New Mexico; $19 in North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas, Florida; $20 in other states and Kansas City, Kans.-Mo.

Unprepared scrap, except heavy breakable cast, $2.50 per gross ton less than prepared. Unprepared railroad scrap is $3.50 less.

High manganese steel scrap takes $7 premium over No. 1 steel when sold for electric furnace use. Machine and shoveling turnings take $4 premium when briquetted; briquetted mixed borings and turnings premium is $3. Railroad steel axles for rerolling or reforging are $6 above No. 1 steel; steel wheels and springs for electric furnace, acid open-hearth or foundry use are $3.50 above No. 1 steel; couplers and knuckles $3 higher. Brake shoes from dealer's yard are $4.75 under No. 1 cupola cast. Premiums for chemical borings are $3 (not over 1% oil) and $2 (1.5% oil).

Grades containing 1% or more nickel take premium of $1 per gross ton for each ¼ of 1% nickel. Grades meeting specifications, (apart from alloy content) for bar crops, punchings and plate scrap, alloy free turnings and heavy turnings, take $2 premium for .15% to .65% molybdenum or $3 for over .65% molybdenum, nothing for nickel under 1% or other alloys. If nickel 1% or more, no premium allowed for molybdenum. Alloy steel scrap conforming to specifications SAE 52,100 and sold for electric furnace use takes $1 premium.

Amendment, March 18, 1942, permits addition of 6% freight rate increase to delivered prices. Amendment April 28, 1942, reduces differential for bundles of tin coated material to $4 below No. 2 dealers bundles. Amendment, May 18, 1942, establishes maximum prices for mixed shipments at maximum of lowest-priced grade, except vessel movements if grades taking different prices are segregated. Amendment, May 26, revises No. 2 heavy melting steel speci-

fication to include material 15 ft. long.

No. 5—Bituminous coal, issued April 2, 1941 fixing prices at levels prevailing March 28, 1941. Revoked May 1, 1941. See No. 120.

No. 6—Iron and steel products, issued April 16, 1941 freezing basing point prices at levels prevailing March 31, 1941; revised June 20, 1941 to establish base prices at April 16, 1941 levels. Revised Feb. 4, 1942.

Covered are iron or steel ingots, semi-finished products, finished hot or cold-rolled products and all products further finished by galvanizing, enameling, plating, coating, drawing, extruding, etc.

Basing point prices are those announced by (1) U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing point; or (2) those prices announced or customarily quoted by other producers at the same designated points. Exception: Base prices under (2) cannot exceed those under (1) except to extent prevailing in third quarter of 1940. Extras may be applied only if charged during two years prior to April 16, 1941. Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific points are deemed basing points except producers may charge governing basing point prices plus rail rates to the latter two areas where water transportation is not available. Domestic ceiling prices are the aggregate of (1) applicable basing point price (2) extras (3) transportation charges to point of delivery as customarily computed. The applicable basing point may be (1) the basing point nearest the consumer providing the lowest delivered price or (2) the basing point at or closest to the place of production or origin of shipment (provided the war emergency requires shipment to be made to place outside mills' usual market area). Contracts drawn prior to April 16, 1941 at other than Schedule prices may be continued until March 15, 1942.

Export ceiling prices may be either the aggregate of (1) domestic basing point nearest place of production (2) export extras (3) export transportation charges or the f.a.s. seaboard price of the U. S. Steel Export Co. on April 16, 1941.

Amendment, March 16, 1942, requires reinstatement of discount of 40 cents per 100 lbs. on sales of bale tie wire. Amendment, March 25, 1942, provides for filing of petitions seeking exception to ceiling prices, in accordance with OPA Procedural Regulation No. 1. Amendment, April 21, 1942 raises steel screen cloth about 5%.

No. 7—Combed cotton yarn, May 26, 1941.

No. 8—Nickel scrap and secondary materials, effective June 2, 1941; amended Sept. 8, 1941, June 17, 1942. Maximum prices to makers on nickel and nickel alloy scrap unprepared for consumption, cents per lb., f.o.b. point of shipment:

Nickel scrap containing 98 per cent or more nickel, not more than 0.50% copper 26.00 per lb.; 90-98 per cent nickel 26.00 per lb. of nickel contained only. Converters (dealers) allowed 2-cent premium in selling to consumers. Shipments of 2000 pounds or more by maker or converter take ½-cent premium.

Ferro-nickel-chrome-iron scrap containing 20-90 per cent nickel 26.50 per lb. of nickel contained, 8.00 per lb. of chrome. Converter's premium 1½ cents. Quantity extra ½-cent 10,000 lbs. or more.

Ferro-nickel-iron scrap containing 14-90 per cent nickel 26.50 per lb. of nickel contained. Converter's premium 1½ cents. Quantity extra ½-cent 10,000 pounds or more.

Monel metal clippings 20.00 per lb.; soldered sheet 18.00; No. 1 castings, turnings 15.00. Converter's premium 2 cents. Quantity extra ½-cent 20,000 pounds or more. Cupro-nickel containing 90 per cent or more combined nickel, copper 26.00 per lb. of nickel contained, 8.00 per lb. of copper, only. Converter's premium 2 cents. Quantity extra ½-cent 20,000 lbs. or more.

Straight chromium-type sheets, clippings, solids $35 gross ton for 12-14% chromium, $40 for 14-18%, $40 plus 9.50c per lb. for each lb. chromium in excess of 18% for grades containing over 18% chromium. Deduct $5 ton for borings and turnings.

Secondary Monel ingots and Monel shot 27.00c per lb., copper-nickel shot 25.50c. Amendment, April 28, 1942, places import prices at domestic levels. Amendment, April 15, 1942, excepts from schedule MRC purchases of stocks of metallic nickel frozen by M-6-b.

No. 9—Hides, kips and calfskins, June 16.

No. 10—Pig iron effective June 24, 1941, freezing prices at levels generally prevailing in second quarter of 1941. Governing basing point prices (gross tons): No. 2 foundry $25 Bethlehem, Everett, Swedeland, Birdsboro, Sparrows Point; $24 Erie, Neville Island, Sharpsville, Buffalo, Chicago, Granite City, Cleveland, Hamilton, Toledo, Youngstown, Detroit; $24.50 Duluth; $20.38 Birmingham, $22 Provo.

For basic iron deduct 50 cents from above except Duluth and Provo which are not bases. Birmingham base $19, Buffalo $23.

Malleable $25.50, Bethlehem, Everett, Swedeland, Birdsboro; $24.50 Erie, Buffalo, Duluth; $24 Neville Island, Sharpsville, Chicago, Granite City, Cleveland, Hamilton, Toledo, Youngstown, Detroit.

Bessemer $26 Bethlehem, Everett, Swedeland, Birdsboro; $25 Erie, Buffalo, Duluth, Birmingham; $24.50 Neville Island, Sharpsville, Chicago, Granite City, Cleveland, Toledo, Youngstown, Detroit.

Low phos $29.50 Steelton, Birdsboro, Buffalo. High silica silveries (6.00-6.50% base) $29.50 Jackson County, O., $30.75 Buffalo. Gray forge $23.50 valley or Pittsburgh. Charcoal $28 Lake Superior, high phos. $28.50, Lyles, Tenn., low phos $33 Lyles.

Ceiling prices are aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to place of delivery as customarily computed. Exceptions: Struthers Iron & Steel Co. may charge 50-cent premium, Pittsburgh Coke & Iron Co. at Sharpsville only. Mystic Iron Works, Everett, Mass., may charge $1 above basing point prices on iron it produces, effective April 20, 1942. In the case of exports only, basing point nearest place of production may be used. Differentials: Silicon 50 cents for each 0.25 points in excess of 1.75-2.25 base. Phosphorous 38 cents for content of 0.70% and over. Manganese 50 cents for each 0.50% over 1.00%.

No. 11—Cotton textiles, June 28, 1941.

No. 12—Brass mill scrap ("byproduct of fabrication of materials produced by brass mills") effective July 22, 1941; amended Oct. 3, 1941. Maximum prices cents per lb. f.o.b. point of shipment for heavy scrap, rod ends and turnings, respectively: Copper 10.25, 10.25, 9.50; yellow brass 8.62½, 8.37½, 7.87½; 95% plus commercial bronze 9.50, 9.25, 8.75; 90-95% commercial bronze 9.37½, 9.12½, 8.62½; 80% min. red brass 9.12½, 8.87½, 8.37½; 71-80% best qual. brass 8.75, 8.50, (no turn., price); 5% nickel silver 9.25, 9.00, 4.62½; 10% ni. sil. 10.12½, 9.87½, 5½; 15% ni. sil. 10.87½, 10.62½, 5½. Above prices for less than 15,000 lbs. any kind or grade; add ¾ cent for 15,000-40,000 lbs. shipped at one time, 1 cent 40,000 or more. Amendment, effective Dec. 27, 1941, permits ceilings to be exceeded through addition of duty on imported metal.

No. 13—Douglas fir plywood, May 1, 1941.

No. 14—Raw silk, Aug. 2, 1941. Revoked Feb. 19, 1942.

No. 15—Copper, effective Aug. 12, 1941; amended Aug. 28, 1941, Feb. 1, 1942. Maximum base prices for electrolytic, lake or other fire refined copper in wire bars or ingot bars made to meet ASTM specifications B5-27 for electrolytic and B4-27 for lake 12.00c lb. delivered in carlots Connecticut valley. Casting copper in wire bars or ingot bars fire refined to 99.5% purity, including silver as copper, 11.75c lb., f.o.b. refinery in carlots, 12.00c in less carlots.

Apply usual delivery differentials for other points. Add ⅛-cent on l.c.l. lots of electro, lake or fire-refined purchased from producers. Prices are gross before deduction of discounts and include commissions.

For other kinds, grades, shapes, forms apply customary premiums or discounts in effect Aug. 11, 1941. Other than producers (dealers) may charge following premiums, casting copper excepted: 0-499 lbs. 2c; 500-999 1½c; 1000-4999 1c and 5000 to carload ¾c.

No. 16—Raw sugar, Aug. 14, 1941.

No. 17—Pig tin, effective Aug. 18, 1941; amended Sept. 19, 1941. Prices ex New York dock or warehouse for foreign tin, ex producers plant for domestic. Grade A 99.80% or higher 52.00c lots of 5 tons or more (includes Straits, Banka, Billiton, Katanga, Chempur, Hawthorne refined, Mellanear guaranteed, Lempriere, Pyrmont, Regis, Vulcan Electrolytic, Metal and Thermit refined, No. 1 and electrolytic). Grade B 99.75-99.79% inclusive and 99.80% or higher not meeting grade A specifications 51.62½c. Grade C cornish refined (99.808%) 51.62½c. Grade D 99.00-99.74% pure, inclusive 51.12½c (includes Chinese, YTC and PKMA brands, English Mellanear L & F brand). Grade E below 99% 51.00c for tin content. For 2240-11,199 lbs. incl., add 1c; 1000-2239 incl. 1½c; 500-999 incl. 2½c; under 500 lbs. 3c. Amendment, March 30, 1942, provides following premiums over maximum prices for export sales: 1c per lb. on 11,200 lbs. or more; 1½c on 2240-11,199 lbs.; 2c on less than 2240 lbs. Cost of packaging and other legitimate charges may be added. Amendment, June 22, 1942, sets premium for special shapes 7 lbs. or less at 1¼c per lb. No premium over 7 lbs.

No. 18—Burlap, effective Aug. 16, 1941.

No. 19—Southern pine lumber, Sept. 5, 1941.

No. 20—Copper and Copper Alloy Scrap, other than of brass mill origin (see No. 12), revised schedule as amended, effective May 11, 1942. Prices in cents per pound, f.o.b. shipping point, including all commissions and service charges, grouped for quantity differentials: Group 1—No. 1 wire and heavy copper, 9.75, No. 2 copper wire and mixed heavy 8.75, light copper 7.75; Group 2—Bell metal 15.75, high grade bronze gears 13.50, babbitt lined brass bushings 13.25, red trolley wheels 11.00, No. 1 tinned copper wire 9.75, bronze paper mill wire cloth 9.50, soft red brass 9.25, soft red brass borings 9.00, aluminum bronze gears 9.25, red

brass breakage 7.75, unlined standard red car boxes 8.25, lined standard red car boxes 7.75, cocks and faucets 8.00, yellow brass castings 6.75; Group No. 3—Clean fired rifle shells 8.25, old rolled brass 7.75, brass pipe and admiralty condenser tubes 8.00, Muntz metal condenser tubes and plated rolled brass sheet, pipe and reflectors 7.50; Group No. 5—Automobile radiators 7.50. Prices on refinery brass, comprising Group No. 4; lead-covered and insulated wire and cable, in group No. 1; high grade bronze and borings and high lead bronze and borings in Group No. 2 are all determined by special formula. Following special preparation premiums may be added, except on sales to copper refiner or brass ingot maker: Crucible shape and briquetting, 1¼-cents on No. 1 wire, No. 1 tinned wire, No. 1 heavy and 1-cent on No. 2 wire and mixed heavy; Special use, 1¼-cents on copper scrap except also to foundry or brass mill; Crucible shape, 1¼-cents on copper alloy scrap. These preparation premiums may not be added if either of the following quantity premiums are added: ¾-cent for 60,000-pounds of one group, except No. 4 and No. 5; ½-cent for 40,000 pounds of one or two groups. Sellers and buyers must keep detailed records of all transactions. Consumers must file reports on Revised forms 120:7a and 120:7b by the 10th of each month covering each receipt of scrap on which settlement was made during preceding calendar month. Order does not apply to conversion of railroad scrap.

No. 21—Formaldehyde, effective Aug. 20, 1941.

No. 22—Pennsylvania grade crude oil, effective Aug. 23, 1941. Pennsylvania Bradford crude per barrel $2.75; Southwest Pennsylvania crude $2.40; Eureka $2.34; Southeastern Ohio $2.30; Oil City-Titusville, group A $2.68.

No. 23—Rayon grey goods, Aug. 24, 1941.

No. 24—Washed cattle tail and winter hog hair, issued Aug. 16, 1941.

No. 25—Fats and oils and their products, effective Aug. 29, 1941, revoked Feb. 23, 1942.

No. 26—Douglas fir lumber, Oct. 1, 1941.

No. 27—Anthracite coal, effective Sept. 12, 1941; revoked Sept. 18, 1941.

No. 28—Ethyl alcohol, effective Sept. 15, 1941.

No. 29—By-product blast furnace and foundry coke, effective Oct. 1, 1941, amended Feb. 7, 1942. By-product foundry coke f.o.b. cars at ovens: Alabama $8.50; Chicago $11.50; Ashland, Ky., Ironton, O., Portsmouth, O., Fairmont, W. Va. $10, Detroit, Buffalo, Erie, Pa., Philadelphia $11.75; Kearny, N. J. $12.15; Painesville, O. $11.25; Chattanooga, $9; Milwaukee $12.25. Delivered prices: Chicago, Detroit, Erie $12.25; St. Louis and East St. Louis $12.25 ($12.75 for producers outside Missouri, Alabama, Tennessee); Indianapolis, Terre Haute $12; Buffalo $12.50; Cincinnati $11.75; Cleveland $12.30; Philadelphia $12.38; St. Paul, Minn. $14; New England $13.75, provided freight from Everett not over $3.10, less 15 cents for cash ten days. Amendment defines areas governed by specific oven prices.

By-product blast furnace coke: 75 cents net ton above weighted average f.o.b. oven price in first quarter 1941. Does not apply to sales or shipments at less than $6 f.o.b. after Sept. 18, 1941.

No. 30—Waste paper sold east of the Rocky Mountains, effective Dec. 15, 1941. No. 1 mixed $14 net ton, f.o.b. point of shipment.

No. 31—Acetic acid, effective Sept. 29, 1941.

No. 32—Paper Board sold east of Rocky Mountains, effective Oct. 1, 1941. Maximum delivered prices per net ton: Single Manila Lined board $60, chipboard $45, white patent coated news board $75.

No. 33—Carded cotton yarns, Oct. 6, 1941.

No. 34—Wood alcohol, effective Oct. 10, 1941.

No. 35—Carded gray and colored yarn cotton goods, effective Oct. 21, 1941.

No. 36—Acetone, effective Oct. 27, 1941. Following revised prices effective Jan. 1, 1942, in cents per lb. delivered in Eastern territory, (add ½-cent for Western territory): 15.8 in tank cars, 16.8 carloads in drums, 17.3 less carloads in drums. Eastern territory includes New Mexico, Colorado, Wyoming, Montana and states east thereof.

No. 37—Normal Butyl Alcohol (butanol), effective Oct. 27, 1941. Following revised prices effective Jan. 1, 1942, in cents per lb. delivered in Eastern territory (add ½-cent for Western territory): 15.8 in tank cars, 16.8 carloads in drums, 17.3 less-carloads in drums. Territories same as in No. 36.

No. 38—Glycerine, effective Nov. 10, 1941. Base maximum prices of 11.50c per lb. for crude glycerine (80 per cent glycerol) and 18.00c per lb. for refined type.

No. 39—Upholstery furniture fabrics, effective Nov. 10, 1941.

No. 40—Builders hardware, effective Nov. 19, 1941. Maximum prices for manufacturers and jobbers are highest levels prevailing during 15-day period ended Oct. 14, 1941. Includes insect screen as well as such items as knobs, locks, hinges, etc. Steel insect screen eliminated, Jan. 16, 1942.

No. 41—Steel castings, effective Dec. 1, 1941. Maximum prices are those prevailing on July 15, 1941. Amendment, Feb. 3, 1942, places ceiling for railroad specialties at Oct. 1, 1941, levels. Amendment, effective March 16, 1942, permits producers of railroad specialty castings to charge for certain extras, coupler repair parts and pattern costs customarily charged between Oct. 1-15, 1941.

Amendment June 25, 1942, permits addition of extra freight cost on shipments of castings beyond foundries' normal shipping area.

No. 42—Paraffin Wax, effective Dec. 1, 1942.

No. 43—Used steel drums and pails, Dec. 1, 1941, amended Jan. 10, Feb. 2, June 10, 1942. Reconditioned units, 14-16 gal., $1.45; 29-33 gal., $1.85; 50-58 gal., $2.25, delivered within 50 miles of reconditioning plant. For each 75 miles or fraction add transportation cost, or 5, 7½ or 10 cents, respectively, for three capacity classifications. Further addition of 15, 25 or 50 cents allowed in California, Washington and Oregon. Reconditioned lined drum suitable as food container takes 15, 20 or 25 cent premium. Maximums for raw used drums bought direct from emptier $0.75, $1 or $1.25. Add 10, 20 or 40 cents in California, Washington and Oregon. When bought from other than emptier, raw used drum maximums are $1, $1.30 or $1.60. If buyer makes own pickup deduct 5, 7½ or 10 cents. Add 10, 20 or 40 cents if raw used drum bought and delivered or picked up in California, Washington or Oregon. Raw steel pails and covers 2, 3, 5-gallon, are 10, 15 and 20 cents; without covers 5, 7, 10 cents; covers 3, 4, 5 cents; reconditioned pails 31, 36, 45 cents.

No. 44—Douglas fir doors, Dec. 10, 1941.

No. 45—Asphalt or tarred roofing products, effective Dec. 12, 1941.

No. 46—Relaying rails, effective Dec. 2, 1941. Maximum price for rails 35 pounds or heavier originating from Class I railroads, switching or terminal companies, $28 per gross ton, f.o.b. any station on the railroad. Dealers or jobbers may charge $30 in resale. Originating other points $30 minus lowest rail freight to base nearest shipping point, but no less than $24. Basing points are Boston, Philadelphia, Buffalo, Pittsburgh, Cleveland, Cincinnati, Detroit, Chicago, Savannah, Ga., Norfolk, Va., Duluth, St. Louis, Birmingham, Houston, Los Angeles, San Francisco, Portland, Oreg., Seattle, Denver. Maximums on warehouse sales $35.84 a gross ton in carlots for 45-60 lb. rails, $39.20 for 35-45 lb. rails. Operation of recognized warehouse must be declared to OPA by Dec. 10, 1941. Contracts made before Feb. 7, 1942 at not over $1.60 per 100 lbs., warehouse, for 25 tons and over may be filled if completed by March 15, 1942. Buyers of 100 tons or more must report to OPA.

No. 47—Old rags, effective Dec. 9, 1941.

No. 48—Flashlights, batteries, bulbs, effective Dec. 10, 1941. Maximums are highest prices quoted Oct. 1 to Dec. 1, 1941. Revoked, Feb. 4, 1942.

No. 49—Iron and Steel Products at Resale, effective Dec. 15, 1941, amended Jan. 30, Feb. 2, 1942. Fixes prices generally at levels prevailing April 16, 1941. For cold-drawn and seamless tubing use prices charged by National Tube Co. distributors; for tool steels Crucible Steel Co. prices. For less-carload lots of standard nails, annealed and galvanized wire for local delivery use mill carload price (minus 15c jobber allowance) add carload freight to warehouse, plus additions of 50c for nails, 60c for annealed wire, 68c for galvanized wire. For outside delivery add less-carload freight. Markup on export sales of all products is limited to 5% for agents, 10% for merchants.

Amendment, March 28, 1942, permits addition of storage charges to export prices of material acquired prior to Dec. 15, 1941, and held because of failure to secure shipping space; also of material shipped to port of exportation prior to March 1, 1942, and subsequently stranded. Provides for export shipments in exceptional cases where Board of Economic Warfare certifies above-ceiling price is necessary.

Amendment, March 31, 1942, allows sellers of merchant wire products at least a 20% mark-up over mill carload delivered prices. Establishes following freight allowances for products sold on Pacific coast to reflect wartime use of all-rail shipments: 75 cents per 100 lbs. on plates, 65 cents on hot and cold rolled sheets, 45 cents on structurals and galvanized sheets, 25 cents on hot-rolled strip, 20 cents on hot rolled merchant bars. Also clarifies status of retailers and sets up simpler procedure for seeking exemption to schedule.

No. 50—Green coffee, effective Dec. 11, 1941.

No. 51—Cocoa Beans and Butter, Dec. 11, 1941.

No. 52—Pepper, effective Dec. 11, 1941.

No. 53—Fats and Oils, effective Dec. 13, 1941.

No. 54—Douglas Fir Peeler Logs, effective Dec. 20, 1941.

No. 55—Second hand textile bags, Dec.

16, 1941. Replaced March 30, 1942, by new schedule setting prices according to size of bag and weight of material.

No. 56—Reclaimed rubber, Dec. 20, 1941. Maximums are highest prices received Nov. 5 to Dec. 5, 1941.

No. 57—Wool floor covering, Dec. 16, 1941.

No. 58—Wool, wool tops, yarns, Dec. 18, 1941.

No. 59—Kapok, Dec. 18, 1941.

No. 60—Direct consumption sugars, effective Dec. 22, 1941.

No. 61—Leather, effective Dec. 29, 1941. Maximum prices are highest prevailing levels between Nov. 6 and Dec. 6, 1941.

No. 62—Cigarettes, effective Dec. 30, 1941.

No. 63—New Rubber Tires & Tubes, effective Jan. 5, revised April 25, 1942.

No. 64—Domestic cooking and heating stoves, effective Jan. 5, 1942. Maximums for regular line stoves are 112% of lowest price quoted by manufacturers from Jan. 15 to June 1, 1941. For private brands maximums are 112% of lowest price charged during same period.

No. 65—Resale of floor coverings, effective Jan. 5, 1942.

No. 66—Retreaded, Recapped Tires, effective Jan. 19, 1942. Establishes maximums for retreading, full capping, or top capping with different grades of camelback and varying tread depth.

No. 67—New machine tools, effective Jan. 21, 1942. Maximum prices for dealers and manufacturers are Oct. 1, 1941 lists or, in absence of such list, last price at which similar articles sold between Jan. 1 and Oct. 1, 1941.
Amended, March 13, 1942, to permit Niagara Machine & Tool Works, Buffalo, to exceed its Oct. 1, 1941, list prices for three machine tools which it manufactures. Amendment, March 28, 1942, grants exemptions on certain tools to Stokerunit Corp., Milwaukee; Fox Grinder Inc., Pittsburgh; Niagara Machine & Tool Works, Buffalo. Amendment, April 7, authorizes Norton Co., Worcester, Mass., to raise price of 150 Model No. 26 Hydrolap machines from $7025 to 7290 each. Defiance Machine Works, Defiance, O., permitted to sell 100 Model 112-21" at $1600 each, 50 Model 200-26" at $2062 each. Exceptions granted April 21 to Gould & Eberhardt and Cleveland Automatic Machine Co.

No. 68—Hide glue stock. Jan. 20, 1942.

No. 69—Primary Lead, effective Jan. 15, 1942. Maximums in cents per pound in carloads delivered St. Louis: Pigs—Common lead 6.35; corroding lead 6.45; chemical lead 6.45; copperized lead 6.40 when made from common lead, 6.50 when made from corroding lead. Ingots or Special Shapes—½-cent higher for each grade. New York prices 15 points above St. Louis; Chicago district 5 points; Detroit, Philadelphia, Cleveland-Akron 15; Pittsburgh, Connecticut, Boston, Springfield, Worcester 20.

No. 70—Scrap and secondary lead, effective Jan. 15, 1942. Maximum scrap prices f.o.b. point of shipment are determined by deducting from the maximum prices for common lead at various basing points the following: .55c for soft, hard and cable lead scrap and .65c for battery lugs and lead content of lead covered copper cable. Maximum secondary prices f.o.b. point of shipment, carlots, determined by applying following differentials to basing points for common primary pig lead: Low grade pig (minus 99.73%) deduct .15c; low grade ingots, linked ingots, other special shapes add .10c; high grade (99.73% plus), base price; high grade ingots, linked ingots, other special shapes, add .50c. Amendment March 31, 1942, raises antimonial lead price 1⅛ cents per pound of contained antimony. Revises method of computing maximum prices for battery lead plates by requiring assay for only lead and antimony content.

No. 71—Cadmium, effective Jan. 19, 1942. Maximum prices for primary and secondary metallic cadmium per pound delivered are 95c for anodes, balls, discs and other special or patented shapes, 90c for bars, ingots, pencils, pigs, plates, rods, slabs, sticks and other regular straight or flat forms. Amendment, June 22, 1942, sets maximum for 5 lbs. or less in containers at highest level is October, 1941.

No. 72—Fuel oil (Bunker C and No. 6 grade), effective Jan. 9, 1942. Revoked March 26, 1942.

No. 73—Fish meal, effective Jan. 20, 1942.

No. 74—Animal product feedingstuffs, effective Jan. 20, 1942.

No. 75—Dead-Burned Grain Magnesite, effective Jan. 28, 1942. Maximum prices per ton, f.o.b. Chewelah, Wash., are $22 in bulk, $26 in bags or sacks. Westvaco Chlorine Products Corp. may charge regular California customers $10 higher from Patterson plant or from stocks at Permanente. Westvaco may charge Vanadium Corp. of America and Mathieson Alkali Works $40.50, f.o.b. Patterson. For export and $7.50 a net ton when packed in double jute sacks, $12.50 in wooden barrels.

No. 76—Hide Glue, effective Jan. 28, 1942.

No. 77—Beehive Furnace Coke, effective Jan. 26, 1942. Maximum for this grade produced in Pennsylvania $6 per net ton, f.o.b. cars ovens, Connellsville, Pa. Does not apply to foundry coke.

No. 78—Oxalic acid, effective Feb. 2, 1942. Maximum prices for carlots in cents per lb., f.o.b. producer's shipping point, for crystalline oxalic acid, 11¼ in containers of more than 290 lbs., 11¾ in containers of 100-290 lbs. Powdered acid 1 cent higher.
Amendment, March 31, 1942, exempts reagent grade from schedule provisions.

No. 79—Carbon tetrachloride, effective Feb. 2, 1942.

No. 80—Lithopone, effective Feb. 2, 1942. Maximum prices cents per lb. delivered in bags in carlots in New Mexico, Colorado, Wyoming, Montana and eastern states: Normal 4.25; high strength barium, calcium 5.60; high strength magnesium 5.75; titanated 5.60; zinc sulphide 8.25. Add ¼-cent for less carlots. Prices other states ¼-cent above eastern territory. Amendment Feb. 27, 1942, permits non-manufacturing dealers and exporters to fill, at higher than ceiling prices, contracts made prior to Feb. 2, 1942. Affects only lithopone on hand or in transit Feb. 2. Detailed reports on such deliveries must be furnished OPA within ten days.

No. 81—Primary Zinc, effective Jan. 29, 1942. Maximum carload prices in cents per lb., f.o.b. E. St. Louis, Ill.; Prime western 8.25; selected 8.35; brass special 8.50; intermediate 8.75. High grade and special high grade are 9.25, delivered. Producers may add 0.15c for 20,000 pounds to carlots, 0.25c for 10,000-20,000 pounds, 0.40c for 2000-10,000 pounds, 0.50c for less than 2000 pounds. Other sellers may add 0.65c, 0.75c, 1.00c and 1.50c for respective quantities.
Amendment, March 13, 1942, requires producers to file with OPA copy of all toll agreements; smelters must file agreements involving zinc made to other than listed specifications which are revised in the amendment.

No. 82—Wire, Cable and Accessories, effective Jan. 29, 1942. Includes hot rolled black or cleaned rods for electrical uses, and copper, copperclad or copper alloy wire used for conducting electricity. Maximum prices are manufacturers net prices on Oct. 15, 1941. Weatherproof wire prices figured against base price of 17.5 cents. For material containing lead, add number of pounds of lead times $0.00325.

No. 83—Radio Receivers and Phonographs, effective Feb. 9, 1942. Manufacturers' maximum prices are highest net prices received Oct. 15, 1941, or in preceding three-month period. OPA must approve prices for models offered after Oct. 15.

No. 84—Parts for Radio Receivers and Phonographs, effective Feb. 9, 1942. Manufacturers' maximum prices are highest net prices received Oct. 15, 1941, or in preceding three-month period.

No. 85—New Passenger Automobiles, effective Feb. 2, 1942. Maximum wholesale prices are highest prices prevailing Oct. 1 to Oct. 15, 1941 (Feb. 2 prices for Packard and Crosley) plus lower of $15 or 1% of list price for each elapsed month after Jan. 31, 1942. Add taxes and fixed delivery charges for retail prices.

No. 86—Domestic Washing Machines, Ironing Machines, effective Feb. 9, 1942. Manufacturers' maximum prices are highest prices quoted Oct. 1-Oct. 15, 1941 (Feb. 2, 1942 prices for Apex Electrical Mfg. Co.). OPA must approve prices for models offered after Oct. 15.

No. 87—Scrap Rubber, effective Feb. 5, 1942. Maximum prices fixed at seven reclaiming centers, including geographical differentials.

No. 88—Petroleum and Petroleum Products, effective Feb. 2, 1942.

No. 89—Bed Linens, effective Feb. 2, 1942.

No. 90—Rayon Waste, effective Feb. 3, 1942.

No. 91—Tea, effective Feb. 3, 1942.

No. 92—Soy Bean and Peanut Oils, effective Feb. 4, 1942.

No. 93—Mercury, effective Feb. 4, 1942. Prime virgin mercury produced in California, Oregon, Washington, Idaho, Utah, Nevada or Arizona, $191 per 76-pound flask. When produced in Texas or Arkansas, $193. When imported from Mexico, $193, f.o.b. United States freight station nearest point of entry, including duty. Other imports $191, f.o.b. port of entry. Agent's selling commission limited to 1% of maximum price. Amendment, effective Feb. 10, 1942, permits dealers with stocks on hand or in transit Feb. 4 to deliver such stocks until March 2, 1942, at prices necessary to meet contracts made prior to Feb. 4. Verified statement of such transactions must be filed with OPA.
Amended March 17, 1942, to permit dealers to split with another dealer or broker the 2 per cent premium allowed.

No. 94—Western Pine Lumber, effective Feb. 15, 1942. Maximum prices generally are those prevailing during period Oct. 1-15, 1941.

No. 95—Nylon Hose, effective Feb. 5, 1942.

No. 96—Domestic Fuel Oil Storage Tanks, effective Feb. 20, 1942. Typical prices for carload shipment of 26-inch, 16-gage steel, 275-gallon capacity tank

are $17.35 in the East, $17.70 in the Midwest, $31.95 in the Far West.

No. 97—Southern Hardwood Lumber, effective Feb. 20, 1942. Cuts prices $2 to $5 a thousand feet from previous levels.

No. 98 — Titanium Pigments, effective March 1, 1942. Prices are those prevailing Oct. 1, 1941. Regular grade, 20 tons or more, delivered in bags in eastern territory, 14½c per pound. Deliveries in western territory ¼-cent higher.

No. 99—Acetyl Salicylic Acid (aspirin), effective Feb. 16, 1942.

No. 100—Cast Iron Soil Pipe and Fittings, effective Feb. 20, 1942. Prices established in terms of minimum discounts from standard revised price list. Minimum discount for 2-6 inch extra heavy pipe 52½-10-10 for carload shipments by rail or 10-ton or greater shipment by truck, 52½ for less-carload by rail or less than 10 tons by truck. Amendment, March 7, 1942, permits warehouse sellers to compute delivery charges by method employed Oct. 1, 1941.
Amendment, March 31, 1942, permits producers to compute delivered prices on emergency shipments of less than 250 pounds in same manner as warehouse shipments are determined.

No. 101—Citric Acid, effective Feb. 16, 1942.

No. 102—Household Mechanical Refrigerators, effective Feb. 9, 1942. Maximum prices for manufacturers whose 1942 model prices were approved by OPA are net prices in effect Feb. 2, 1942. Prices of all new models must be approved by OPA.

No. 103—Salicylic acid, effective Feb. 16, 1942.

No. 104—Vitamin C, effective Feb. 16, 1942.

No. 105—Gears, Pinions, Sprockets, Speed Reducers, effective Feb. 18, 1942. Maximum prices are those in effect Oct. 15, 1941. Prices of special items not made before are to be computed on basis of Oct. 15, labor and material costs, using price-setting method employed on that date. Amendment, April 8, 1942, exempts manufacturers whose 1941 sales were less than $5000 from submitting monthly reports. Excludes automotive and tractor transmissions and rear axle assemblies from list of speed reducers.

No. 106—Domestic Shorn Wool, effective Feb. 28, 1942.

No. 107—Used Tires and Tubes, effective March 16, 1942. Establishes maximum retail prices varying with tread thickness.

No. 108—Nitrogen Fertilizing Materials, effective March 23, 1942.

No. 109—Aircraft Spruce, effective April 1, 1942. Maximum prices vary up to $690 per 1000 board feet, plus extras when the lumber is kiln dried.

No. 110—Household Mechanical Refrigerators (Resale), effective March 30, 1942. Ceilings are manufacturers' recommended retail price lists. Margins of wholesale distributors limited to Oct. 1-15, 1941 levels.

No. 111—Household Vacuum Cleaners (Resale), effective March 30, 1942. Ceilings are manufacturers' recommended retail price lists. Margins of wholesale distributors limited to Oct. 1-15, 1941, levels.

No. 112—Anthracite Coal, effective April 1, 1942. Freezes prices at Oct. 1-15, 1941 levels.

No. 113—Iron Ore, effective April 10, 1942. Applies to ore produced in Minnesota, Wisconsin and Michigan. Maximums are weighted average spot prices, based on Lower Lake ports delivery, at which spot sales of such ore were made during 1941 shipping season. "Escalator" clause eliminated from unexpired contracts. Maximum for ore shipped from mine idle in 1940 and 1941 is equivalent of $4.45 per gross ton, Lower Lake ports, for Mesabi Nonbessemer 51.50% iron, adjusted for grade and analysis. Base prices on other grades: Mesabi Bessemer $4.60; Old Range Nonbessemer $4.60; Old Range Bessemer $4.75; High Phosphorus $4.35. Penalties for silica and fine structure and premium for lump ore for open hearth use are those prevailing in 1941. Producers must report by 10th of month on preceding month's production and sales.

No. 114—Wood pulp, effective April 20, 1942.

No. 115—Silk Waste, April 25, 1942.

No. 116—China, Pottery, April 27, 1942.

No. 117—Used Egg Cases, April 23, 1942.

No. 118—Cotton Products, May 4, 1942.

No. 119—Tires and Tubes (Original Equipment), April 27, 1942. Maximum prices are 5% above highest levels prevailing in 1941.

No. 120—Bituminous Coal, May 18, 1942. Fixes mine prices at Oct. 1-15, 1941 levels.

No. 121—Miscellaneous Solid Fuels, May 18, 1942. Fixes producers' prices at Dec. 15-31, 1941, levels.

No. 122—All Solid Fuels, May 18, 1942. Fixes prices for dealers other than producers at Dec. 15-31, 1941 levels.

No. 123—Wool Waste, April 28, 1942.

No. 124—Rolled Zinc Products, May 11, 1942. Fixes producers prices at Nov. 29, 1941 levels.

No. 125—Nonferrous Castings, May 11, 1942. Fixes producers' prices at Oct. 1-15, 1941 levels.

No. 126—Fluorspar, May 11, 1942. Fixes producers' prices at Jan. 2, 1942, levels.

No. 127—Finished Piece Goods, May 4, 1942.

No. 128—Processing Piece Goods, May 4, 1942.

No. 129—Paper, Products, Raw Materials, May 11, 1942. Fixes prices generally at Oct. 1-15, 1941 levels.

No. 130—Newsprint Paper, May 11, 1941.

No. 131—Camelback, May 11, 1941. Manufacturers' prices fixed at March, 1942 level.

No. 132—Waterproof Footwear, May 11, 1942.

No. 133—Farm Equipment, May 11, 1942. Fixes retail prices at Oct. 1-15, 1941, level.

No. 134—Road Machinery, May 11, 1942. Rental charges to user fixed at Oct. 1-15, 1941 levels.

No. 135—Mixed Fertilizer, April 28, 1942.

No. 136—Machines and Parts, July 1, 1942. Maximum prices for new units or machine work are those in effect Oct. 1, 1941, or based on costs prevailing that date. For used units, maximums are 85% of Oct. 1 price for rebuilt and guaranteed machines and parts, 55% for others. Covers accessories, such as perishable tools, as well as complete machines.

No. 137—Motor Fuel, May 18, 1942. Maximum service station prices are highest March, 1942, levels.

No. 138—Ferromanganese, May 1, 1942. Carload lots of 78-82% grade, f.o.b. Atlantic Seaboard, $135 per gross ton. Differential for each 1% manganese down to 75% and up to 85% is $1.70. Prices are f.o.b. Rockdale or Rockwood, Tenn., for Tennessee Products Corp., Birmingham for Sloss Sheffield Steel & Iron Co. Extras per gross ton: $6 for packed carload lots; $10 for gross ton lots packed; $13.50 for less than ton lots when packed down to 200 pounds, $18 when less than 200 pounds. Premiums for crushing to specified mesh are those of April 28, 1942.

No. 139—Used Household Mechanical Refrigerators, effective May 18, 1942. Establishes maximum prices for used units of various makes.

No. 140—Sanitary Napkins, May 20, 1942.

No. 141—Shearlings, effective May 13, 1942.

No. 142—Summer Seasonal Commodities, effective May 18, 1942. Sets retail prices.

No. 143—Tires and Tubes (Wholesale), effective May 18, 1942.

No. 144—Insecticides and Fungicides, effective May 18, 1942. Sets retail prices.

No. 145—Pickled Sheepskins, effective May 23, 1942.

No. 146—Appalachian Hardwood, effective May 19 and June 1, 1942.

No. 147—Bolts and Nuts, effective May 28, 1942. Maximum prices for bolts, units, screws and rivets set at Oct. 1-15, 1941, levels.

No. 148—Pork Products, May 21, 1942.

No. 149—Mechanical Rubber Goods, effective May 27, 1942. Effective June 15 on government contracts dated prior to May 18, 1942; July 1 on sales to War and Navy Departments. Maximum prices of standard industrial items are Oct. 1, 1941 levels; custom-made goods figured on Jan. 5, 1942, costs.

No. 150—Milled Rice, May 25, 1942.

No. 151—New Bags, May 25, 1942.

No. 152—Canned Vegetables, May 25, 1942.

No. 153—Women's Clothing, May 29, 1942.

No. 154—Ice, May 25, 1942.

No. 155—Central Hardwood Lumber, June 1.

No. 156—Beef Products, June 2, 1942.

No. 157—Military Textiles, Apparel, June 4, 1942.

No. 158—"War" Bicycles, June 5, 1942. Maximum retail prices $32.50 in East, $33.50 in Midwest, $34.50 in Far West.

No. 159—Concrete Reinforcing Bars, (fabricated) effective June 15, 1942. Allows fabricator margin of 50 cents per 100 lbs. above f.o.b. mill price. Maximum delivered price of fabricated bars in cents per lb., 2.40. Exceptions: 2.77 if bought by fabricator at Gulf basing point price, 2.80 at Pacific Coast basing point; 2.57 delivered Toledo; 2.52 in carloads delivered Detroit.

No. 160—Wooden Agricultural Containers, June 6, 1942.

No. 161—West Coast Logs, June 20, 1942.

No. 162—Sale and Rental of Used Typewriters, July 1, 1942.

No. 163—Woolen & Worsted Civilian Ap-

No. 164—Red Cedar Shingles, effective **parel Fabrics,** effective June 22, 1942. June 29, 1942.

No. 165—Consumer Service, effective July 1, 1942. Covers any service sold to ultimate consumer other than industrial or commercial user.

No. 166—Zinc Oxides, effective June 22, 1942. Maximum delivered price for carlots of leaded zinc oxides containing 35% or more lead 7.00c per lb. Premium for less-carlots ¼-cent.

No. 167—Rayon Yarn and Staple Fiber, effective June 27, 1942.

No. 168—Converted Rayon Yarn, effective June 24, 1942.

No. 169—Beef & Veal (wholesale), effective July 13, 1942.

PRODUCTION REQUIREMENTS PLAN

Priorities Regulation No. 11 (Production Requirements Plan), issued by the War Production Board June 11, requires every large user of metal to obtain a quarterly authorization for all his scarce material requirements.

Operation under this Plan formerly was voluntary. Starting July 1, its use becomes mandatory for all companies using quarterly $5000 or more worth of a specified list of 36 types of metals —including iron and steel and the common nonferrous metals—with the following exceptions:

United States or other government agencies (not including those engaged in manufacture, such as shipyards, arsenals, prison factories, etc., which are subject to the requirements); companies or persons engaged in: Transportation; furnishing of heat, light, power, electricity, gas or water to others; mining or quarrying; production, refining, transportation, distribution or marketing of petroleum or associated hydrocarbons; communications; sewerage or drainage; wholesaling, retailing, warehousing or other similar operations which do not involve manufacture or processing of materials; extracting, refining, alloying or processing metal ores or scrap into raw metal; construction.

With these exceptions, all companies using metals worth $5000 or more in a quarter are required to file a PRP application on Form PD-25A before July 1. For the benefit of companies using less than $5000 worth of basic metal quarterly and therefore not required to apply under the Production Requirements Plan, a percentage of the total supply of materials will be set aside, and these companies may obtain their minimum requirements from this reserve by use of the regular priorities procedures previously in effect.

An interim procedure is provided to allow companies which have properly filed an application but have not yet received a rating certificate under PRP to continue applying preference ratings under any appropriate "P" order (even if the "P" order was scheduled to expire on June 30) or individual preference rating certificates, or to extend preference ratings on orders which the company is engaged in filling.

However, the company may not use any such preference rating or ratings to obtain more than 40 per cent of the amount of any given material which has been indicated in its PRP application as the estimated requirement for the quarter, and any material so obtained must be deducted from the amount authorized on the PRP certificate when it is received. No producer who is required to come under the Production Requirements Plan and who fails to file an application on PD-25A by June 30 may use any preference rating after that date except ratings specifically assigned for construction or capital equipment.

No company which has received a PRP certificate may apply or extend any other preference rating except for capital equipment or construction, and no such company may accept delivery of materials listed in Materials List No. 1 of PD-25A, or other materials for which he has sought priority assistance, in greater quantities than those authorized on the certificate, even if the materials can be obtained without use of a preference rating.

Companies operating under PRP which need capital equipment or priority assistance for construction or expansion may apply in the usual way on PD-1A or PD-200 and PD-200A application forms.

The list of metals referred to by this regulation follows:

METALS LIST

(a) Any of the metals listed in subparagraph (1) below in any of the forms listed in subparagraph (2) below:

(1) Metals:

Iron; Carbon Steel; Alloy Steel; Stainless Steel; Aluminum; Magnesium; Copper; Brass; Bronze; Lead (including antimonial); Zinc; Nickel; Tin; Cupronickel; Monel; Nickel-silver; Chrome Nickel; Babbitt Metal.

Solder Type Metal; Metal Carbides; Antimony; Arsenic; Beryllium; Bismuth; Cadmium; Cobalt; Iridium; Mercury; Molybdenum; Palladium; Platinum; Platinum-iridium alloy; Rhodium; Ruthenium; Tungsten.

(2) Forms of Metal:

Anodes, bars, billets, blooms, blocks, castings, (including die castings), cones, dust, extruded shapes, fabricated shapes, foil, forgings, ingots, pigs, pipe, plates, powder, rails, refinery shapes, rings, rivets, rods, scrap, sheets, shot, skelp, slabs, strip, structural shapes and piling, tie plates and track accessories, tube and tubing, tube rounds, wheels and axles, wire and wire rods, wire products (including barbed and twisted fencing, bale ties, nails, staples, rope and strand).

(b) The following ferro-alloying agents:

Calcium Molybdate; Ferrochromium; Ferrocolumbium; Ferromanganese; Ferromolybdenum; Ferronickel; Ferrotitanium; Ferrotungsten, Ferrouranium; Ferrovanadium; Ferrozirconium; Ferrocarbon-titanium; Ferrophosphorus; Ferrosilicon; Silicomanganese; Spiegeleisen.

(c) The following oxides and other compounds of nonferrous metals:

Aluminum chloride, anhydrous; Aluminum fluoride; Aluminum oxide, refined; Antimony oxide; Chromic oxide; Chromite (exclude refractory grades); Cobalt oxide; Copper sulfate; Lead carbonate; Lead Oxide (litharge) Lead Peroxide; Lead sulfate; Magnesium Oxide; Mercuric oxide.

Mercury chlorides; Molybdenum oxide; Nickel Oxide; Potassium chloride; Potassium chromate and dichromate; Sodium chromate and bichromate; Sodium tungstate; Tin chlorides; Titanium dioxide; Tungsten ores and oxides (basis 60 per cent WO_3); Vanadium oxide; Zinc oxide, leaded; Zinc oxide, lead free; Zinc sulfate.

PREFERENCE RATING APPLICATION

Use of preference ratings has been simplified and standardized by the terms of an amendment to Priorities Regulation No. 3.

Effective July 1, any preference rating, no matter how it has been assigned, may be applied or extended by a single form of certification, which states merely that the purchaser certified to the seller and to WPB that he is entitled to use the preference ratings indicated on his purchase order, in accordance with the terms of Priorities Regulation No. 3.

Provisions of existing orders which require a purchaser to furnish this supplier with copies of preference rating orders or other special certifications are all rescinded, except for the special provisions of Priorities Regulation No. 9 with respect to the application of preference ratings for certain types of exports. This change does not, however, affect any provision of existing preference rating orders which limits the kinds of material which may be obtained by use of the assigned rating, or which requires specific information on purchase orders.

In addition to the standard certification, orders on which a preference rating is applied or extended after July 1, must also include the identification symbols required by Priorities Regulation No. 10, which established the Allocation Classification system.

The amended regulation No. 3 restricts extension of preference ratings, in most cases, to material which will be delivered to, or physically incorporated in a product delivered to the person to whom the rating was originally assigned, or which will be used to replace in inventory materials so delivered, subject to definite limitations. A rating may not be extended to replace materials in inventory except to the extent necessary to restore the inventory to a practicable working minimum. No rating higher than A-1-B, may be assigned to orders for replacement of materials in inventory, even though the order for which the materials were used may have carried a higher rating.

Special provision is made for small manufacturers not operating under the PRP. Such producers may extend ratings to deliveries of operating supplies including lubricants, small perishable tools, etc., which are required and will be consumed in filling the rated order which they are extending, but the cost of such operating supplies must not exceed 10 per cent of the cost of the materials to which the rating is extended and which such supplies are used to process. Not more than 25 per cent of the operating supplies obtained in this way during any month may be metals in the forms described in the metals list of priorities regulation No. 11.

Class 1 producers as defined in Priorities Regulation No. 11—large users of metals required to apply under the production requirements plan—are prohibited from extending ratings for any purpose after July 1. They must file PD-25-A applications to obtain their materials requirements, and they may apply only ratings assigned on their PRP certificates or ratings specifically assigned to them for construction or acquisition of capital items. Ratings assigned on PRP certificates, like all other ratings, will be applied by the standard form of certification prescribed by the amended regulation No. 3.

ALLOCATION CLASSIFICATION SYSTEM

ALLOCATION Classification System which will enable the War Production Board to trace the flow of materials in terms of end-use from primary producers to finished products has been established by the Division of Industry Operations of WPB.

The new system will be used on all purchase orders and reports to WPB and will supersede a variety of use classifications now required under materials ("M") orders.

Allocation classification symbols must be used on all orders placed by manufacturers, fabricators and primary producers after June 30 and on all such orders which call for deliveries after July 31, regardless of when orders for materials were placed.

Essential features of Priorities Regulation No. 10, establishing the classification, follow:

PRIORITIES REGULATION NO. 10—Allocation Classification System—(a) *Classification System Established.* There is hereby established an Allocation Classification System, in accordance with the Instructions issued by the Director of Industry Operations on the date of issuance of this Regulation. Except as provided in paragraph (b) below, the appropriate Allocation Classification Symbol and Purchaser's Symbol as required by said Instructions shall be indicated by every person placing a purchase order or contract on:

(1) All purchase orders or contracts placed after June 30, 1942:

(2) All purchase orders or contracts, either heretofore or hereafter placed, calling for delivery after July 31, 1942. Any person who has heretofore placed such a purchase order or contract may at any time hereafter and shall before July 31, 1942, notify the person with whom such purchase order on contract has been placed of the symbols applicable thereto.

(b) *Exceptions as to Retail Purchases.* The provisions of paragraph (a) hereof shall not be applicable to retail purchases, purchases by retailers or purchases by distributors for resale to retailers. Industrial and mill suppliers, warehouses and other businesses performing similar functions for industry shall not be deemed retailers for the purposes of this paragraph.

J. S. Knowlson,
Director of Industry Operations.

Purpose and General Instructions

I. Purpose

The purpose of the Allocation Classification is:

(1) To obtain standardization and reduce the rules of different forms for allocation purposes that industry now must submit to the War Production Board.

(2) To furnish information needed by the War Production Board in the allocation of materials.

To allocate intelligently, it is necessary to know the subdivision of the war, industrial and civilian programs for which materials are going to be used. For example, it is essential to know whether the materials are going to tanks, or destroyers, or railroads, or to office machinery and supplies in order to determine allocation policy. In addition, it is necessary to know in a general way what type of purchasers will eventually receive particular products of industry, i.e. whether the products will eventually be delivered to the Army, Navy, etc.

Accordingly, a dual classification system has been provided consisting of Allocation Classification Symbols (in the form of numbers), which will designate the particular kind of product for which material ordered will be used and Purchasers' Symbols (in the form of letters) to indicate the general type of purchasers to which delivery will be made.

Neither the allocation classification symbols nor the purchasers' symbol are intended to indicate order of importance, but are merely designed to provide a convenient means

(1) of identification of the subdivisions of the program for which the products or materials ordered are destined;

(2) of identification of the type of ultimate purchaser of the product; and

(3) of transmitting such identification on down through industry to the original suppliers of the material.

Retail purchases and purchases by retailers, will not transmit an allocation or purchaser's symbol on their orders. Since the retailer does not place an allocation or purchaser's symbol on its orders, the manufacturer, wholesaler or distributor receiving these orders will place the Purchaser's symbol DP, on these orders. Industrial and mill suppliers, warehouses and businesses performing similar functions for industry are not deemed retailers.

II. Allocation Classification Number System

A. General Description

Each business is assigned to a numbered Class with certain exceptions discussed in paragraph (2) below, and most Classes are, in turn, divided into subclasses indicated by a decimal number.

In general terms every purchase order is to carry its allocation classification symbol.

There are two principal kinds of situations to distinguish in selecting the proper classification:

(1) The business of the purchaser ma)

fall directly into one or more of the Allocation Classifications. In this case the business simply places on its purchase order the symbol representing the business for which the purchase order is placed.

For example, the manufacturer of tanks places the symbol 3.10 on all its purchase orders. The truck manufacturer uses 10.20. The railroad uses 10.10.

(2) The business of the purchaser does not fall directly into any of the classifications. In this case, the purchaser has no symbol to identify its own business but simply transmits the symbol it receives on the purchase orders which its customers have placed with it.

For example, the manufacturer of electric motors receiving an order from a railroad bearing the symbol 10.10 places the same symbol 10.10, on its purchase order.

Mixed cases are covered below.

Once a business has determined in which situation it finds itself, it should then place the proper symbol or symbols on every purchase order which is issued.

B. Procedure for Use of Classifications

(1) Each business should first determine whether or not its operations fall directly into one or more of the allocation classifications listed or whether it should use the Allocation Classification symbols that are on the orders which it receives from its customers.

To determine this, each business should consult the Specific Instructions and the detailed Classified or Alphabetical Lists. These should furnish the necessary information to enable each business to classify its operations properly.

(2) Each business directly falling in any class should consult the "Specific Instructions" covering its classification for any specific instructions that may apply to that classification alone.

(3) Where the operations of a business fall directly into one or more Allocation Classifications—

a. Any business whose operations fall directly into one Allocation Classification should place its classification symbols on all purchase orders that it issues regardless of what they are for. For example, a railroad ordering metalworking machinery would classify the order under Railroad (10.10) despite the fact that metalworking machinery is a separate classification.

b. Any business whose operations fall directly into two or more Allocation Classifications should transmit the symbol of each classification to the extent that it can trace the particular purchase to the proper classification under its established methods of bookkeeping or inventory control. Where this is not practicable, it should place on its purchase orders the percentage division between its sales for the latest available month. For example, a company engaged in the manufacture of household furniture and office furniture and maintaining a single inventory should place on its orders 16.00—60%, 19.00—40%.

(4) In the case of a business manufacturing parts of sub-assemblies, such as electric motors, air compressors, ball bearings, etc., which do not fall directly within any of the listed classifications—

a. Where an item can be traced directly to one Allocation Classification, the business should transmit the classification symbol for that item on its purchase order. For example, if a storage battery company orders materials to be used in the manufacture of storage batteries for automobiles, the symbol for automobiles (10.20) should be placed on the purchase order.

b. Where an item can be traced to two or more Allocation Classifications, the business should transmit on the purchase order for that item the percentage division between Allocation Classifications based on the dollar volume of its sales using the latest available month as the base period. The following principles should be followed in doing this:

1. Where the business falling under any one Allocation sub-class comprises 5% or more of the total business, that symbol and its percentage are transmitted on the purchase order.

2. Where the business falling under any one Allocation sub-class is less than 5% of the total dollar volume and can be grouped with other sub-classes falling under one main Allocation Class, it should be so grouped. For example, a percentage division might be: Classification 5.10—Ammunition 20 mm. and above 3%; Classification 5.20—Ammunition, small arms below 20 mm.—4%. Since both 5.10 and 5.20 are sub-classes of the Class 5.00, the two should be combined under the main Class and reported as: 5.00—7%.

3. After combining the sub-classes under any one Class, if the Class still totals less than 5%, this portion of the business should be pro-rated over the classifications which are 5% or more.

III. Purchasers' Symbols

In addition to the information required in respect to Allocation Classification symbols, the War Production Board will still have need of the information which is already being furnished as to whether the orders are placed by the Army, the Navy, etc. This will be continued and slightly extended. A series of letter symbols has been adopted to indicate the purchaser.

Purchaser	Symbol
The Army	USA
The Navy—includes Maritime Commission	USN
Lend-Lease	LL
Other Foreign Purchasers	FP
Domestic Purchasers	DP

When Orders bearing these symbols are received by a business, the business must pass them on to its suppliers even though the Allocation number may be changed.

The appropriate purchaser's symbol should in each case precede the numerical allocation symbol placed on purchase orders so that the Allocation Classification will be broken down by Army, Navy, Lend-Lease, etc. The same instructions for transmission in percentages, etc., apply to these symbols as to the Allocation symbols.

IV. Application to Existing Orders

It is essential that classification symbols and purchasers' symbols should be applied not only to all orders to be placed in the future but also to existing orders that have already been placed for delivery after July 31, 1942. To do this, it is the responsibility:

(1) Of each business that falls directly into one or more Allocation Classifications to review the orders that it has already placed and advise each of its suppliers as to what classification symbols and purchasers' symbols should be applied.

(2) Of each business that does not fall directly into one of these classifications (i.e. manufacturers of Parts or Subassemblies), to transmit to all its suppliers with whom purchase orders have been placed the Classification symbols and purchasers' symbols that it receives from its customers.

(3) Of the Army and Navy Procurement officers and of the Maritime Commission to advise their Prime Contractors as to what purchasers' symbols should be applied to the purchase orders that these services have already placed with them.

If any business is in doubt as to how it should classify its operations and transmit the classification symbols or purchasers' symbols to its suppliers, it should communicate with the War Production Board at the nearest Field Office or in Washington, D. C.

ALLOCATION CLASSIFICATION SYMBOLS

(NOTE: The symbol numbers have no relation to order of importance.)
Allocation Symbol

MILITARY

Class 1.00—Aircraft—Production and Maintenance (complete except for armament and ammunition—as approved by the Joint Aircraft Committee).

Class 2.00—Ships, Production and Maintenance (complete except for armament and ammunition).

2.10 Battleships.
2.20 Aircraft Carriers.
2.31 Escort Vessels (aircraft), combat, loaded transports, and combat loaded cargo ships.
2.32 Patrol Vessels.
2.33 Landing craft including the following types: APM, ATL, YTL, tank lighters, artillery lighters, landing boats, support landing boats.
2.40 Light Cruisers.
2.50 Destroyers including escort vessels.
2.60 Submarines.
2.70 All other types of naval craft.
2.80 Repairs to all naval vessels.
2.90 Ships for Maritime Commission.

Class 3.00—Vehicles—Production and Maintenance (complete except for armament and ammunition).

3.10 Tanks and armored vehicles—all types.
3.20 Vehicles, except rail—all other military types.

Class 4.00—Armament and Weapons—Production and Maintenance (complete mounts and related equipment).

4.10 Aircraft.
4.20 Anti-aircraft, Barrage Balloon Equipment, A. A. Searchlights.
4.30 Artillery including railway and seacoast.
4.40 Fire control, all types.
4.50 Machine guns—ground, hand arms.
4.60 Naval, all types.
4.70 Tanks and anti-tank.
4.90 Weapons of all other types.

Class 5.00—Ammunition — Production and Maintenance (complete items).

5.10 Ammunition 20 mm. and above.
5.20 Ammunition, small arms below 20 mm.
5.30 Bombs, depth charges, mines, and torpedoes.
5.40 Propellants, chemicals, explosives.
5.50 Pyrotechnics.

Class 6.00—War Equipment and Supplies—Production and Maintenance (complete with related equipment).

6.10 Chemical Warfare equipment and supplies.
6.20 Clothing, general supplies and subsistence.
6.30 Mapping, Map Reproduction and photographic equipment.
6.40 Medical Equipment and supplies.
6.50 Military field construction equipment.
6.60 Military radio and wire communications, and Radar or electronic equipment—all types.
6.70 Military railway including rail vehicles and bridge equipment.
6.80 Supplies and equipment—all other military types.
6.90 Supplies and equipment—all other.

Class 7.00—War Facilities—Construction and/or Maintenance.

7.10 Air Fields, Bases, Camps, Coast Defense, Depots, Forts, Navy Yards, Posts, Stations—Continental U. S. A.
7.20 Air Fields, Bases, Camps, Coast Defense, Depots, Forts, Navy Yards, Posts, Stations—outside Continental U. S. A.
7.30 Munitions manufacturing facilities and proving grounds—government owned.
7.40 Panama Canal.
7.50 Shipyards and ship repair facilities—government owned.

INDUSTRIAL AND CIVILIAN

Class 8.00—Raw Materials, Production and Processing of.

8.10 All Metals, Production (including mining) Smelting and Processing of.
8.20 All Chemicals, Production and Processing of.

8.90 All other Raw Materials, Production and Processing of.

Class 9.00—Power, Light, and Heat.

9.10 Electricity.
9.20 Petroleum.
9.30 Coal and Coke.
9.40 Gas.

Class 10.00—Transportation.

10.10 Railroad including Urban and Interurban.
10.20 Automotive.
10.30 Roads, Streets, etc., Construction and Maintenance of.
10.40 Water Transportation, including construction of privately owned shipyards.
10.50 Air Transportation.
10.90 All Other Transportation.

Class 11.00—Communication.

11.10 Telephone.
11.20 Radio.
11.30 Telegraph.
11.90 All Other Communication.

Class 12.00—Public Health and Safety.

12.10 Sanitary & Health Systems & Facilities.
12.20 Health Equipment and Supplies including Personal Care.
12.30 Public Safety Equipment and Supplies.

Class 13.00—Agricultural Equipment and Supplies.

Class 14.00—Industrial Food Processing.

Class 15.00—Wearing Apparel.

Class 16.00—Equipment and Supplies for Household Use.

Class 17.00—Education and Information.

17.10 Printing and Publishing.
17.20 Education.

18.00 **Class 18.00—Recreation and Amusement.**

19.00 **Class 19.00—Equipment and Supplies for Office Use.**

Class 20.00—Machinery and Equipment for Industrial Use.

20.10 Metalworking machinery.
20.20 All other—including Mine, Construction, Special & General Industrial.

Class 21.00—New Buildings, Construction of.

21.10 Buildings for Manufacturing and Commercial Purposes, Construction of.
21.20 All Types of Dwellings, Construction of.
21.90 All Other Types of Buildings, Construction of.

Class 22.00—Operating Supplies and Building Repair & Maintenance.

23.00 **Class 23.00—All Other End Uses**—(excludes all sub-assemblies and parts going into finished products coming with the other classes).

SPECIFIC INSTRUCTIONS

Classes 1.00 Through 7.00—Military

The responsibility for placing the proper Allocation Symbols for the military classifications rests with the Army, Navy and Maritime Commission officers who will also indicate, on all new orders, whether the order is for the Army or Navy and Maritime Commission.

Class 8.00—Raw Materials, Production and Preliminary Processing of

This Allocation Classification is to be used by industries engaged in the production and preliminary processing of raw materials. The production and preliminary processing of raw material is defined here as the operations required to convert them from the state in which they are found in nature to the condition in which thy are described in Materials List No. 1, attached to War Production Board Form PD-25A. For example, all the steps necessary for turning standing timber into accepted shapes and sizes of lumber would fall into this category. The steps to fabricate the lumber into other wood products would not be included.

In the case of agricultural products, the steps to be included in this class start after the product has been harvested and continue until it is ready for industrial use, for example, the processing of cotton only through the ginning.

These symbols should be placed on all orders for supplies, equipment, machinery and facilities necessary for the production and preliminary processing of raw materials but should not be placed on orders for materials which are processed or are incorporated in the finished raw material. All orders for materials which enter into the production of or become a part of the finished raw material will bear the symbol transmitted by the customer's orders. For example, a steel mill producing rails for a railroad company will transmit the railroad's symbol of 10.10 on all orders for iron ingots, coke and alloy metals. Orders for office machinery, metal working machinery and other operating equipment and supplies will carry the symbol of the steel mill (8.10).

Where a company processes raw materials only as an incident to its main production, it should not classify its order with any of the numbers in this classification, but should use only the number that applies to its main operation.

Construction of new buildings, and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

8.10—All Metals, Production (including Mining), Smelting and Preliminary Processing of

This Allocation Symbol should be placed on purchase orders for supplies, equipment, machinery and facilities issued by companies conducting such operations as:

Aluminum Plants, Brass Mills, Copper Refineries, Smelters, Steel Mills, All types of Metal Mining, etc.

8.20—All Chemicals, Production and Preliminary Processing of

This Allocation Symbol should be placed on purchase orders for supplies, equipment, machinery and facilities issued by companies producing and processing chemicals up to the point that they are ready for industrial use.

Chlorine, Alcohol, Sulphur, Lacquer, Paint, Plastics, Synthetic Rubber, Varnishes, etc.

8.90—All Other Raw Materials, Production and Preliminary Processing of (Exclusive of Petroleum, Coal and Coke, see Classes 9.20 and 9.30)

This Allocation Symbol should be placed on purchase orders for supplies, equipment, machinery and facilities issued by companies conducting such operations as:

Manufacture of Textiles, Glass Making, Lumbering, Production of building materials, e.g., Asphalt, Stone products, Brick, Plaster, Cement, Sand, etc.

Class 9.00—Power, Light and Heat

9.10—Electricity: All public electric generating and distributing systems should place the classification number on all purchase orders issued by them except for construction of new buildings, and building maintenance and repair which should not be included in this classification (see Classes 21.00 and 22.00).

This classification is not to be used on orders for wiring and equipment necessary to make use of electricity in a plant or in the home. The wiring and equipment for distributing electricity through a plant, home, etc., and orders for private, industrial, farm or home generating plants, should bear the proper symbol for new construction or building maintenance and repair (see Classes 21.00).

9.20—Petroleum: All companies concerned with the production of petroleum, refining, pipeline construction and operation, storage and retail distribution of petroleum, oil and gasoline, should place this Allocation Symbol on all purchase orders they issue.

Construction of new buildings and building maintenance and repair should not be included in this Classification (see Classes 21.00 and 22.00).

9.30—Coal and Coke: All Companies engaged in the production and distribution of coal and coke should place this Allocation Symbol on all purchase orders they issue. The construction of coke ovens should be included but the construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

9.40—Gas: All public gas companies engaged in the production and distribution of both natural and manufactured gas should place this Allocation Symbol on all purchase orders for material, equipment and supplies, etc., that they issue except for construction of new buildings and building maintenance and repair (see Classes 21.00 and 22.00).

Orders for equipment and pipe for using gas in industrial plants and homes should not bear this number but should be classified with the proper construction symbol (see Classes 21.00 and 22.00).

Class 10.00—Transportation

10.10—Railroad including Urban and Interurban: All railroads, railways and street car companies should place this Allocation Symbol on all purchase orders that they issue except for construction of new buildings and building maintenance and repair (see Classes 21.00 and 22.00).

Purchase orders for mine railroad equipment and privately owned intra-plant railroad equipment should not transmit this symbol but should bear the proper industry symbol.

10.20 — Automotive: All companies manufacturing automobiles, trucks, buses, trailers, taxis, automotive repair parts and accessories, tires, retreading machinery etc., should place this Allocation Symbol on the purchase orders that they issue except for the construction of new buildings and building maintenance and repair (see Classes 21.00 and 22.00).

10.30—Roads, Streets, etc., Construction and Maintenance of: All orders for the construction, maintenance and repair of roads, streets, automobile bridges and tunnels, storm sewers, highway signs, and fences, traffic lights and other traffic control facilities should carry this Allocation Symbol.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

The responsibility for placing this classification number on the order lies with the contractor or the local, state or federal government agency which originates the order.

10.40—Water Transportation, including Construction of privately owned Shipyards: All orders for material, equipment, and supplies for the construction of ships (other than those classified under "military" which will be placed in Class 2.00 by the government department placing the order) operating supplies, repair and maintenance of the ships themselves, ship safety devices, lighthouses, docking facilities, loading and unloading equipment, shipyards, buoys, and other water traffic control devices, etc., should carry this Allocation Symbol.

Construction of new buildings and building maintenance and repair should not be included in this Classification (see Classes 21.00 and 22.00).

The responsibility for placing the Allocation Symbol on the order rests with the shipping company, ship builder, or other agency originating the order.

10.50—Air Transportation: All orders for material, equipment and supplies necessary for the manufacture of airplanes other than those approved by the Joint Aircraft Committee, orders for repair, maintenance and operating supplies needed to maintain air transportation

and airports, airlane markers, other air traffic control and safety devices should bear this Allocation Symbol.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

The responsibility for placing the Allocation Symbol on orders rests with the airline, with the manufacturer in the case of private planes or with the government agency which originates the order.

10.90—All Other Transportation: Manufacturers of other means of transportation such as motorcycles, bicycles, wagons, etc., should place this Allocation Symbol on all orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 11.00—Communication

11.10—Telephone: Orders for all apparatus and equipment necessary to provide and maintain telephone service, and supplementary related services furnished by the telephone companies, and all orders for the repair, maintenance and operating supplies for furnishing telephone service should bear this Allocation Symbol.

Orders for material for the construction, maintenance and repair of central office and other buildings should not be given this Symbol, but should be placed in Class 21.00 and 22.00.

All orders placed by the manufacturers of telephone equipment should also carry this Allocation Symbol.

11.20—Radio: This Allocation Symbol should be placed on all orders for materials, supplies and equipment for commercial radio equipment, both by those operating radio stations and systems and those engaged in the manufacture of the equipment. Orders for materials, etc., going into home, portable and automobile radio equipment should not be given this Symbol but that for equipment and supplies for household use—Class 16.00.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

11.30—Telegraph: All public telegraph companies should place this Symbol on orders for all apparatus and equipment necessary to provide and maintain telegraph service and on orders for the repair, maintenance and operating supplies for furnishing telegraph service.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

11.90—All Other Communication: Manufacturers of all other means of communication such as loud speaker or buzzer systems, etc., should use this Allocation Symbol on all purchase orders that they issue.

Signal systems such as rockets, flares, signal flags, sirens, bells, and beacons are not included in this Classification and purchase orders in regard to them should be given the Allocation Symbol of the customer.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 12.00—Public Health and Safety

12.10—Sanitary Systems and Facilities: This Allocation Symbol should be placed on all orders for materials, equipment, supplies, etc., for water systems, sewage systems, garbage disposal plants, etc.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

12.20—Health Equipment and Supplies including Personal Care: Manufacturers of hospital and doctors' supplies, drugs and medicines, dental equipment, surgical instruments, X-Ray equipment, toilet preparations, soap, etc., should place this Allocation Symbol on all purchase orders issued.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

12.30—Public Safety Equipment and Supplies: Manufacturers of police and fire equipment, fire alarm equipment, non-military gas masks, sirens, decontamination equipment for civilian use, fire extinguishers, etc., should use this Allocation Symbol on all purchase orders that they issue. State and local police and fire authorities will also place this Allocation Symbol on all purchase orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 13.00—Agricultural Equipment and Specialized Agricultural Supplies

Manufacturers of agricultural implements, tools, equipment, machinery, feeding stuffs, fertilizer, fungicides, insecticides, etc., used on farms and in the care of livestock, poultry, bees, nurseries should place this Allocation Symbol on all purchase orders that they issue.

This Symbol should not be applied, however, to orders for materials for the construction of new buildings or building maintenance and repair (see Classes 21.00 and 22.00).

Class 14.00—Industrial Food Processing

Industrial food processors such as bakeries, canners, candy makers, packers, soft drink makers, tobacco and cigarette companies, etc., should use this Allocation Symbol on all purchase orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this Classification (see Classes 21.00 and 22.00).

Class 15.00—Wearing Apparel

Manufacturers of all types of non-military wearing apparel including footwear, hats, gloves, and work clothes of all types should place this Allocation Symbol on all purchase orders that they issue

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 16.00—Equipment and Supplies for Household Use

As defined here, equipment and supplies for household use cover purchase orders for companies manufacturing all movable equipment including home, portable, and automobile radio receivers, furnishings and supplies used in homes, hotels, restaurants, laundries, dry-cleaning and pressing establishments, but not food products, health supplies, and other items specifically included in other classifications.

Manufacturers of such articles as beds, carpets, chinaware, cooking utensils, cutlery, electrical appliances for domestic use, all types of laundry equipment, silverware, stoves, glassware, etc., should place this Allocation Symbol on all purchase orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 17.00—Education and Information

17.10—Printing and Publishing: All publishers of newspapers, magazines, and books and all establishments engaged in lithographing, photo-engraving, blueprinting, photostating, etc., should place this Allocation Symbol on all purchase orders that they issue.

The symbol does not apply, however, to such things as playing cards, etc., which should be placed in Class 18.00.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

17.20 — Education: Schools, colleges, universities and other educational institutions should place this Allocation Symbol on all purchase orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 18.00—Recreation and Amusement

Businesses engaged in the manufacture of photographic equipment and supplies, athletic and sporting goods, musical instruments, etc., and businesses which operate carnivals, amusement parks, theaters, etc., or produce motion pictures should place this symbol on all purchase orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 19.00—Equipment and Supplies for Office Use

This Allocation Symbol should be used by manufacturers of such things as adding and calculating machines, typewriters, pencils, stationery, mimeograph machines and office furniture on all their purchase orders except for the construction of new buildings and building maintenance and repair (see Classes 21.00 and 22.00).

Class 20.00—Machinery and Equipment for Industrial Use

This classification should be used on all purchase orders by makers of industrial machinery and equipment. Industrial machinery is defined as all machinery, except office machinery, customarily carried as a capital item, and used for manufacturing purposes. It does not include any equipment or machinery physically incorporated in any end product included in another heading of this Classification.

The special purpose machinery and equipment necessary to provide the essential services listed in the Classification, such as Power and Light, Transportation and Communication, are not included in this classification as they are separately listed classes but the machinery used in the manufacturing of these special purpose facilities is included. To illustrate, locomotives, trucks, generators for a light and power plant, equipment to provide telephone service, diesel engines or turbines for ships are not included in this classification but are covered by their respective listed classifications. The machinery used to manufacture the locomotive, truck, generator, telephone equipment, diesel engine or turbine is, however, included under this Symbol.

20.10—Metal Working Machinery

Manufacturers of machine tools and metal working machinery should place this classification number on all orders for materials.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

20.20—All Other Industrial Machinery Including Mining, Construction, Special and General Industrial Machinery

Manufacturers of mining machinery, construction machinery, special purpose industrial machinery such as textile machinery, and general industrial ma-

chinery such as conveyors not actually incorporated into the building itself, should place this Allocation Symbol on all orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 21.00—New Buildings, Construction of

The prime contractor has the responsibility for placing these Allocation Symbols on all purchase orders he issues for materials and equipment for the construction of all types of civilian and industrial buildings. These classification numbers should be placed on orders for all items which are actually incorporated into the building itself, i.e., such things as elevators, escalators, plumbing and heating systems, wiring, incinerators and air-conditioning systems where they are actually attached to and form part of the building. Portable air-conditioning units, industrial machinery, refrigerators, stoves, and other similar items should not be included under this symbol. Orders for materials for the construction of government owned war facilities should be assigned Class 7.00 symbols.

21.10—Buildings for Manufacturing and Commercial Purposes, Construction of

This Allocation Symbol should be placed by the prime contractor on all orders for materials, equipment, etc., for buildings such as:

All types of buildings for industrial plants including assembly and warehouse buildings, all types of railroad buildings, buildings for electric generating plants, hangars, commercial and private and other commercial airport buildings, mine buildings, office buildings, stores, telephone control offices and repeater stations, etc.

21.20—All Types of Dwellings, Construction of

This Allocation Symbol should be placed by the prime-contractor on all orders for materials, equipment, etc., ordered for buildings such as:

Apartment houses, civilian barracks, clubs, homes, hotels, etc.

21.90—All Other Types of Buildings, Construction of

This Allocation Symbol should be placed by the prime contractor on all orders for materials, equipment, etc., for buildings such as:

Farm outbuildings, barns, fire stations, garages, greenhouses, health centers, hospitals, jails and prisons, kennels, motion picture houses, police stations, public buildings (except dwellings, see Class 21.20).

Class 22.00—Operating Supplies and Building Repair and Maintenance

Note: This classification is intended primarily for manufacturers of articles and supplies usually designated as "operating supplies."

This classification is provided for manufacturers of operating supplies and building repair and maintenance supplies. Operating supplies are defined here as those supplies which are consumed in the manufacture of a product or are necessary for maintaining the manufacturing process, but are not physically incorporated into or are not a component part of the finished product. These operating supplies include such items as small tools, cordage and twine, electric light bulbs, grease pumps and guns, etc.

This Symbol will be transmitted by the manufacturer of operating supplies. Manufacturers falling under other classifications will not use this classification but will place on their orders for operating supplies their own Allocation Symbol. For example, a manufacturer of automobiles who orders screw drivers will use classification 10.20 on his orders. The company which manufactures the screw drivers will transmit the Symbol 22.00 on his orders.

Building repair and maintenance includes the manufacturers of such products as plumbing and heating supplies, electrical wiring, ornamental grill work, door and window sash, etc., which are not identifiable as going into new construction. In other words, orders for the above supplies not coming under classes 21.10, 21.20 or 21.90 will be listed as Class 22.00.

Any items listed in other classifications as, for example, working gloves, Class 15.00—Wearing apparel, or repair parts for items listed in other classifications, as, for example, repair parts for autos and trucks, should not be included in this classification.

Class 23.00—All Other Uses (Note: This does not include finished products listed in other classes.)

Manufacturers who do not directly fall into any other classifications as set forth, above or whose products, such as subassemblies, are not incorporated into some other final product, should place this Allocation Symbol on all purchase orders that they issue.

It should not be used by manufacturers whose products can be classified as repair, maintenance and operating supplies for any construction or manufacturing operation listed here or by manufacturers or processors of subassemblies, semi-finished products or parts that enter into a finished product, or by manufacturers whose products are used in the repair and maintenance of existing buildings. Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Examples of those who should use the Allocation Symbol are manufacturers of artists' materials, jewelry, clocks, watches, luggage, novelties, etc.

Manufacturers of such things as bearings, motors, and sub-assemblies should not use this Allocation Symbol but should transmit those Symbols which are transmitted to them on the orders received from their customers.

CLASSIFIED LIST

This list is not intended to be complete but to be helpful to industry as a guide in determining a company's allocation classification.

If no allocation can be found that applies to the operations of a particular business, that business will transmit to its suppliers the allocation symbols received on its customers' orders.

The Military Allocation Classifications (1.00 to 7.00 inclusive) are applied by the military agency concerned and no product or industry list is necessary.

CLASS 8.00—RAW MATERIALS, PRODUCTION AND PRELIMINARY PROCESSING OF

8.10—All Metals, Production (Including Mining) and Preliminary Processing of: This symbol should be used by companies engaged in operations such as,

Alloying, rolling and drawing of non-ferrous metals; aluminum alloying, rolling and drawing; aluminum plants, operation of.

Blast furnace products, manufacture of; brass mills, operation of.

Cast-iron pipe and fittings, manufacture of; castings, metal, manufacture of; cold-rolled steel sheets and strip and cold-finished steel bars, manufacture of; copper mines, operation of; copper refineries, operation of.

Fencing, manufacture of; forgings, manufacture of; foundries, operation of.

Grey-iron and semi-steel castings, manufacture of.

Iron mines, operation of.

Lead and lead foils, production of.

Malleable-iron castings, manufacture of; metal bars, manufacture of; mining companies, operation of.

Non-ferrous metal foundries, operation of.

Pipes of iron, steel, and other metal, manufacture of; primary smelting and refining of all metals.

Rails and railroad spikes, manufacture of; reinforcing steel, manufacture of.

Sheet metal, manufacture of; smelters, operation of; steel castings, manufacture of; steel mills, operation of; steel works and rolling mills, operation of; structural steel, manufacture of.

Tin and other foils, manufacture of; etc. etc.

8.20—All Chemicals, Production and Preliminary Processing of: This symbol should be used by companies engaged in such operations as,

Acetone, manufacture of; acids, manufacture of; alum, manufacture of.

Bluing, manufacture of; bone black, carbon black, and lamp black, manufacture of.

Camphor, manufacture of; cellophane, manufacture of; chlorine, manufacture of; coal tar products, crude and intermediate, manufacture of; colors and pigments, manufacture of; compressing and liquifying gases other than in petroleum or gasoline plants; cottonseed oil, manufacture of.

Dextrine and dextrose, manufacture of.

Essential oils, production of; ether, manufacture of.

Fish, and marine oils, manufacture of.

Gelatine, manufacture of; glue and gelatine, manufacture of; grease and tallow (except lubricating grease), manufacture of; gum naval stores (turpentine and rosin), manufacture of.

Nitrate, production of.

Paints, varnishes and lacquers, manufacture of; phosphorous, manufacture of; plastic raw materials, manufacture of.

Salt, production of; shellac, manufacture of; sodium compounds, manufacture of; soybean oil, production of; sulfur, production of.

Tanning materials, natural dyestuffs, mordants and sizes, manufacture of.

Varnishes, manufacture of; vegetable oils, production of (except cooking).

Wood naval stores (turpentine, rosin, etc.), manufacture of; etc., etc.

8.90—All Other Raw Materials, Production and Preliminary Processing of (exclusive of Petroleum, Coal and Coke, see Classes 9.20 and 9.30): This symbol should be used by companies engaged in such operations as,

Artificial leather, manufacture of; asbestos, mining and processing of; asphalt, production of.

Batting, padding and wadding, production of; boot and shoe findings, production of; brick and hollow structural tile, manufacture of; building stone, manufacture of.

Cement, manufacture of; concrete products, manufacture of; cotton woven goods and fabrics, manufacture of; cut stone for building, manufacture of.

Dyeing and finishing cotton, rayon, silk, linen, woolen and worsted textiles.

Excelsior, manufacture of.

Flat glass, manufacture of; floor and wall tile, manufacture of; furs, dressing and dyeing.

Glass making; gypsum products, manufacture of.

Hatters fur, production of.

Insulation and mineral wool, manufacture of.

Knitted cloth, manufacture of.

Leather, tanning, curing and finishing; lime, manufacture of; linen goods, manufacture of; lumbering.

Mineral wool, manufacture of.

Natural graphite, ground and refined, manufacture of; nonclay refractories, operation of.

Oilcloth, manufacture of.

Paper and paper-board mills, operation of; planing mills, operation of; plaster, manufacture of; plywood mills, operation of; processed waste and recovered wool fibers, production of; pulp mills, operation of.

Rayon fabrics, manufacture of; rayon yarn and thread, manufacture of; roofing, asphalt, shingles, roof coating, manufacture of.

Sand, production of; sand, lime, brick, block, tile, production of; sawmills, operation of; slate, quarrying and production of.

Wallboard, and wall plaster, manufacture of; wool pulling; etc., etc.

CLASS 9.00—POWER, LIGHT AND HEAT.

9.10—Electricity: This Classification is to be used by all public electric generating and distributing systems.

9.20—Petroleum: All companies engaged in the production, refining, storage, transportation by pipe line, and the distribution of petroleum and petroleum products are included

in this Classification. Companies primarily engaged in drilling oil wells and the construction and operation of petroleum pipe lines are also covered by this Classification Symbol.

9.30—Coal and Coke: All companies engaged in mining coal, producing coke and the storage and distribution of these two products should be placed in this category.

9.40—Gas: All public gas companies engaged in the production and distribution of both natural and manufactured gas are classified under the Allocation Symbol 9.40.

CLASS 10.00—TRANSPORTATION.

10.10—Railroads, including Urban and Interurban: All public railroads, interurban railways, and street car companies come under this Classification. Mine railroads and privately owned intra-plant railroads should not be placed in this Classification but in the Classification applicable to the industry concerned.

10.20—Automotive: This symbol should be used by companies engaged in such operations as,

Auto repair shops, operation of; automobile accessories, manufacture of; automobile bodies, manufacture of; automobile brakes and brake parts, manufacture of; automobile trailers, manufacture of; automobiles, manufacture of; automotive electrical equipment, manufacture of; automotive repair shop equipment, manufacture of.

Buses, manufacture of.

Garages and auto repair shops, operation of.

Heaters, auto, manufacture of.

Passenger automobiles, manufacture of.

Retreading machinery, operation of.

Taxis, manufacture of; tire retreading; tires and inner tubes, manufacture of; trailers, manufacture of; truck trailers, manufacture of; trucks, manufacture of.

10.30—Roads, Streets, Etc., Construction and Maintenance of: This symbol should be used by companies engaged in such operations as,

Bridges, highway, construction of.

Electric street traffic signals, manufacture of.

Highway fences, construction of; highway markers, manufacture of.

Roads, construction of; road maintenance; road oilers, manufacture of; road sweepers, manufacture of.

Snowplows (road and highway), manufacture of; sprayers and sprinklers for street and highway use, manufacture of; storm sewers, construction of.

Traffic signs, electric, manufacture of; tunnels, highway, construction of; etc., etc.

10.40—Water Transportation, including construction of privately owned shipyards, other than military: This symbol should be used by companies engaged in such operations as,

Barges, building and repair of; boat building and repairing; buoys, manufacture of.

Canals, construction and operation of; canoes, manufacture of.

Docking facilities for ships, operation of.

Ferries, operation of.

Light houses, construction and maintenance of.

Marine motors, manufacture of.

Outboard motors, manufacture of.

Rope and cable for marine use, manufacture of; rowboats, manufacture of.

Shiploading equipment, manufacture and operation of; ship safety devices, manufacture of; ships, construction of; shipyards, operation of.

Yachts, manufacture of; etc., etc.

10.50—Air Transportation: Companies engaged in the operation of airlines, companies manufacturing aircraft and aircraft parts not used for military purposes and companies manufacturing such specialized equipment as airlane markers, air traffic control and safety devices, flares, etc., are included under this Classification.

10.90—All Other Transportation: This symbol should be used by companies engaged in such operations as,

Bicycle motors and accessories, manufacture of; bicycles, manufacture of.

Carriages and other horsedrawn vehicles, manufacture of.

Motorcycle engines and accessories, manufacture of; motorcycles, manufacture of.

Sleds, manufacture of.

Wagons (except farm), manufacture of; etc., etc.

CLASS 11.00—COMMUNICATION.

11.10—Telephone: All public telephone companies and manufacturers of apparatus and equipment necessary to provide and maintain telephone service are placed under this Allocation Classification.

11.20—Radio: All companies operating commercial radio stations and systems and manufacturers of commercial radio equipment belong in this Allocation Classification. Manufacturers of home, portable, and automobile radio equipment should use Classification 16.00.

11.30—Telegraph: Public telegraph and cable companies and manufacturers of apparatus and equipment necessary to provide and maintain telegraph and cable service use this Allocation Classification.

11.90—All Other Communication: This symbol should be used by companies engaged in such operations as,

Buzzer systems, manufacture of.

Loud speaker systems, manufacture of; etc., etc.

CLASS 12.00 — PUBLIC HEALTH AND SAFETY.

12.10—Sanitary and Health Systems and Facilities: This symbol should be used by companies engaged in such operations as,

Garbage disposal plants, construction and operation of (except new buildings).

Incinerators for trash and garbage, construction and operation of (except new buildings).

Sewage systems, construction and operation of.

Water systems (Public), construction and operation of; water purification plants, construction and operation of; water reservoirs, construction and operation of; etc., etc.

12.20—Health Equipment and Supplies including Personal Care: This symbol should be used by companies engaged in such operations as,

Abdominal supports, manufacture of; abrasive points, wheels, and disks for dental use, manufacture of; aluminum ware for hospital use, manufacture of; anesthesia apparatus, manufacture of; anthropometrical, astronomical, chemical, physical and physiological apparatus, manufacture of; artificial limbs, manufacture of.

Barber chairs, manufacture of; barber shop equipment, manufacture of; barbers' clippers, manufacture of; beauty shop equipment, manufacture of; braces, manufacture of; burrs and drills for dental use, manufacture of.

Cabinets and cases for barber and beauty shops, manufacture of; compacts for cosmetics, manufacture of; cosmetics, manufacture of; crutches, manufacture of.

Dental chairs and cabinets, manufacture of; dental equipment and supplies, manufacture of; dental sterilizers, manufacture of; drugs and medicines, manufacture of; dry shavers, manufacture of.

Electrocardiographs, manufacture of; equipment cabinets for hospitals, manufacture of.

Fracture appliances, manufacture of.

Hair curlers, manufacture of; hair driers, electric, manufacture of; hair work (wigs, braids, switches, etc.), manufacture of; hand and face driers, manufacture of; hand instruments for dentists; health lamps, ultra-violet and infra-red, manufacture of; hospital, doctors' and dental equipment, manufacture of; hospital furniture, manufacture of; hospital signalling devices, manufacture of; hospital, surgical, and other "sterilizers", manufacture of; hypodermic needles, manufacture of.

Immersion sterilizing needles, manufacture of; inhalators, manufacture of.

Manicure instruments, manufacture of; medicines, manufacture of; metal beds and chairs for hospitals, manufacture of; microscopes, manufacture of.

Operating tables, manufacture of; ophthalmic goods, lenses, and fittings, manufacture of; optical instruments and lenses, manufacture of; orthodomic appliances, manufacture of.

Perfumes, cosmetics, and other toilet preparations, manufacture of; physicians' diagnostic apparatus, manufacture of; physico-theraphy equipment, manufacture of.

Razors and razor blades, manufacture of; refractometers, spectrometers, spectroscopes, polariscopes and optical measuring instruments, manufacture of.

Scalpels, forceps, and similar instruments, manufacture of; spectacle and eyeglass frames, manufacture of; sphygomanometers, manufacture of; soap, manufacture of; stethographs, manufacture of; stethoscopes, manufacture of; surgeons' knives, manufacture of; surgical and medical instruments, manufacture of; surgical belts, manufacture of; surgical blades, manufacture of.

Telescopes, manufacture of; toilet preparations, manufacture of; tooth brushes, manufacture of; tooth paste, manufacture of; trusses, manufacture of.

Veterinarians' instruments, manufacture of; vibrators (health), manufacture of.

X-Ray and theropeutic apparatus and electronic tubes, manufacture of; X-Ray apparatus for dental use, manufacture of; X-Ray apparatus for medical use, manufacture of; etc., etc.

12.30—Public Safety Equipment and Supplies: This symbol should be used by companies engaged in such operations as,

Burglar alarm and hold-up apparatus, manufacture of.

Decontamination equipment for civilian use, manufacture of.

Fire and watch signal apparatus, manufacture of; fire extinguishers, manufacture of; fire stations, operation of; firearms for police authorities, manufacture of.

Gas masks for civilian use, manufacture of.

Municipal fire and police signal systems, manufacture of.

Police stations, operation of.

Radio sending and receiving sets for use by police and fire authorities, manufacture of.

Sirens for use by police and fire authorities, manufacture of; sprinklers and automatic fire detecting apparatus, manufacture of; etc., etc.

CLASS 13.00—AGRICULTURAL EQUIPMENT AND SUPPLIES.

This symbol should be used by companies engaged in such operations as,

Agricultural machinery, manufacture of; asparagus knives, manufacture of.

Barn door hangers and track, manufacture of; barn scrapers, manufacture of; baskets for fruit and vegetables, manufacture of; bookkeepers' supplies, manufacture of; beet drills, manufacture of; beet lifters, manufacture of; boning and skinning knives, manufacture of; broadcast seeders, manufacture of; brooders, manufacture of.

Calf weaners, manufacture of; cane mills, (farm size), manufacture of; cattle dehorners, manufacture of; combines, manufacture of; corn binders, manufacture of; cider mills and fruit pressers (farm), manufacture of; corn cribs, manufacture of; corn huskers, manufacture of; corn pickers, manufacture of; corn planters, manufacture of; corn shellers, manufacture of; cotton planters, manufacture of; cream separators (farm use), manufacture of; cultivators, manufacture of.

Disc plows, manufacture of.

Electric fence controllers, manufacture of; elevators (farm use), manufacture of; engines for farm use, manufacture of; ensilage cutters, manufacture of; ensilage harvesters, manufacture of.

Farm machinery, manufacture of; farm wagons, manufacture of; feed cookers, manufacture of; feed cutters, manufacture of; feeds for animals and fowl, manufacture of; feed grinders and crushers, manufacture of; fertilizers, manufacture of; fruit pickers, manufacture of; fungicides, manufacture of.

Garden planters, manufacture of; garden tractors, manufacture of; gates, farm, manufacture of; girdling knives, manufacture of; grain binders, manufacture of; grain drills, manufacture of; grain threshers, manufacture of.

Harrows, manufacture of; harness hardware, manufacture of; harvesters, manufacture of; hay carriers, manufacture of; hay forks, manufacture of; haying machinery, manufacture of; hay loaders, manufacture of; haypress combines, manufacture of; hay presses, manufacture of; hog rings, manufacture of; hog scrapers, manufacture of; hog troughs, manufacture of.

Incubators, manufacture of; insecticides, fungicides, and related chemical compounds, manufacture of; irrigation system, construction and operation of.

Land rollers (farm), manufacture of; laying batteries, manufacture of; lime spreaders, manufacture of; listers, manufacture of; livestock drinking cups, manufacture of.

Machets, manufacture of; manure spreaders, manufacture of; milking machines, manufacture of; mowers (farm) manufacture of.

Nursery knives (orchard), manufacture of.

Pea and bean harvesters, manufacture of; pea and bean threshers, manufacture of; peanut pickers, manufacture of; planters, manufacture of; potato diggers, manufacture of; potato planters, manufacture of; potato sorters and graders, manufacture of; poultry equipment, manufacture of; poultry feeders, manufacture of; poultry growing batteries, manufacture of; poultry waterers, manufacture of; prepared feeds for animals and fowl, manufacture of.

Rakes, manufacture of; rice binders, manufacture of; rod weeders, manufacture of; rotary hoes, manufacture of.

Saddlery, harness and whips, manufacture

of; shepherds' crooks, manufacture of; silos, manufacture of; soil pulverizers, manufacture of; spraying outfits (farm), manufacture of; stalk cutters, manufacture of; steel plow shapes or shares, manufacture of; stock feeders, manufacture of; stock pens, manufacture of; stock tanks, manufacture of; subsoil plows, manufacture of; syrup evaporators (maple), manufacture of.

Tank heaters (farm), manufacture of; threshing machines, manufacture of; tillers, manufacture of; track for hay carriers, manufacture of; tractors, agricultural use, manufacture of; transplanters, manufacture of.

Wagons for agricultural use, manufacture of; water pumps, (farm), manufacture of; watering troughs, manufacturing of; weeders, manufacture of; wind mills, manufacture of; etc., etc.

CLASS 14.00—INDUSTRIAL FOOD PROCESSING.

This symbol should be used by companies engaged in such operations as,

Baking powder, yeast, and other leavening compounds, manufacture of; beet sugar, manufacture of; biscuits, crackers, and pretzels, manufacture of; bread and other bakery products, manufacture of.

Candy and other confectionary products, manufacture of; cane sugar, manufacture of; canning and drying of fruits and vegetables (including canned soup); canning of fish, crustacea and mollusks; cereal preparations, manufacture of; cheese, manufacture of; chewing gum, manufacture of; chocolate and cocoa products, manufacture of; cigarettes, manufacture of; cigars, manufacture of; condensed and evaporated milk, manufacture of; cooking and other edible fats and oils, production of; corn sirup, corn sugar, corn oil, and starch, manufacture of; creamery butter, manufacture of; curing of fish; custom slaughtering.

Flavoring, extracts and sirups, manufacture of; food preparations, manufacture of; flour and other grain-mill products, milling of.

Ice cream and ices, manufacture of.

Liquors, distilled, manufacture of; liquors, rectified or blended, manufacture of.

Macaroni, spaghetti, vermicelli, and noodles, manufacture of; malt, manufacture of; malt liquors, manufacture of; meat packing, wholesale.

Non-alcoholic beverages, manufacture of.

Oleomargarine, manufacture of.

Poultry dressing and packing; preserves, jams, jellies and fruit butter, manufacture of.

Quick-frozen food, manufacture of.

Rice cleaning and polishing.

Salad dressings, manufacture of; sausage and sausage casings, production of; soda fountains, beer-dispensing equipment and related products, manufacture of.

Tobacco and snuff, manufacture of.

Vinegar and cider, manufacture of.

Wines, manufacture of; etc., etc.

CLASS 15.00—WEARING APPAREL.

This symbol should be used by companies engaged in such operations as,

Buckles for clothes, manufacture of; buttons, manufacture of.

Children's and Infant's wear, manufacture of; clothing, leather and sheep-lined, manufacture of; corsets and allied garments, manufacture of.

Dress and semi-dress gloves and mittens, manufacture of.

Embroideries.

Footwear, manufacture of; fur coats and other fur garments, accessories, and trimmings, manufacture of.

Handkerchiefs, manufacture of; hat and cap materials, trimming, etc., manufacture of; hat bodies and hats, fur and wool felt, manufacture of; hats, straw, manufacture of; hooks and eyes, manufacture of; hosiery, all types, manufacture of; house dresses, uniforms and aprons, manufacture of.

Knitted underwear, manufacture of.

Lace goods, manufacture of; leather gloves and mittens, manufacture of.

Men's and boys' hats and caps, manufacture of; men's and boys' shirts, suits, coats and overcoats, manufacture of; men's neckwear, manufacture of; millinery, manufacture of.

Needles, pins, hooks and eyes and slide and snap fasteners, manufacture of.

Pins, manufacture of.

Raincoats, and other waterproof garments, manufacture of; robes, lounging garments and dressing gowns, manufacture of; rubber boots and shoes, manufacture of.

Shoe buckles, manufacture of; shoe lace tips, manufacture of; shoes, manufacture of; slide fasteners, manufacture of; suspenders and garters, manufacture of; snap fasteners, manufacture of (and clasps).

Trimmings, stamped art goods, and art needle work, manufacture of.

Umbrellas, parasols and canes, manufacture of.

Women's and Misses' clothing, manufacture of; women's and misses' neckwear, scarfs, etc., manufacture of; women's pocketbooks, purses and handbags, manufacture of; work clothing, manufacture of; work gloves and mittens, manufacture of; work shirts, manufacture of; etc., etc.

CLASS 16.00—EQUIPMENT AND SUPPLIES FOR HOUSEHOLD USE.

This symbol should be used by companies engaged in such operations as,

Air heaters, electric, manufacture of; aluminum ware for household use, manufacture of.

Baby carriages, manufacture of; bathroom, kitchen and baby scales, manufacture of; broom racks, manufacture of; brooms, manufacture of; brushes, manufacture of.

Can openers, manufacture of; carpets, rugs, and mats made from such materials as paper fiber, jute, grass, flax, sisal, cotton, coca fiber, and rags, manufacture of; china firing and decorating; clothes racks, manufacture of; coffee pots, manufacture of; commercial laundry, dry cleaning and pressing; corn poppers, manufacture of; cups, manufacture of; curtains, draperies and bed spreads, manufacture of; cutlery, manufacture of.

Desk and reading lamps, manufacture of; dish washing machinery, manufacture of; domestic, hotel and restaurant cooking stoves, manufacture of; drainboards, tub covers, radiator covers, and table tops, manufacture of; dust pans, manufacture of.

Earphones and parts (domestic radios), manufacture of; egg beaters, manufacture of; electric broilers, manufacture of; electric logs for fireplaces, manufacture of; electric percolators, manufacture of; electric water coolers, manufacture of.

Fireplace screens and andirons, manufacture of; fish scalers, manufacture of; flashlights, manufacture of; flat irons, manufacture of; flower vases, manufacture of; food warmers, manufacture of; frying pans, manufacture of.

Garbage cans, manufacture of.

House furnishings, manufacture of; household brooms, manufacture of; household brushes, manufacture of; household utensils, manufacture of.

Knife sharpeners, manufacture of.

Lamp shades, manufacture of; Lanterns and other outdoor fixtures, manufacture of; laundry equipment, domestic, manufacture of; laundry tubs, manufacture of; lawn mowers, manufacture of.

Mattresses and bed springs, manufacture of; Metal household furniture, manufacture of; metal pot scourers and kitchen wire goods, manufacture of; milk coolers, manufacture of; mirror frames, manufacture of; mop wringer parts, manufacture of.

Nut crackers and picks, manufacture of.

Oil stoves, manufacture of.

Paint and varnish brushes, manufacture of; paring knives, manufacture of; picture frames, manufacture of; portable ovens, manufacture of; portable lamps, (table, boudoir, bridge, and floor), manufacture of.

Radio cabinet parts (domestic use), manufacture of; radio chassis bases, manufacture of; radio parts, manufacture of; radio set analyzer, manufacture of; radio tube checkers, manufacture of; radios and radio tubes (sending and receiving sets), for domestic use, manufacture of; range boilers, manufacture of; refrigerators for domestic, restaurant and hotel use, manufacture of; roasters, manufacture of.

Scissors, manufacture of; sewing machines, domestic, manufacture of; sewing machine needles, manufacture of; spoons, manufacture of; stainless steel kitchen ware, manufacture of; steam tables (food), manufacture of; stoves and ranges for cooking, manufacture of; sugar bowls, manufacture of; syphon bottles, manufacture of.

Table cutlery, manufacture of; teapots, manufacture of.

Vacuum cleaners, manufacture of.

Upholstered household furniture, manufacture of.

Wallpaper, manufacture of; wash basins, manufacture of; whisk brooms, manufacture of; etc.

CLASS 17.00—EDUCATION AND INFORMATION.

17.10—Printing and Publishing: This classification should be used by companies engaged in such operations as,

Blueprinting; bookbinding and related industries; books, printing and publishing of.

Electrotyping and stereotyping; engraving for plate printing.

General commercial printing; gravure, rotogravure and rotary photogravure plates, manufacture of.

Job printing.

Lithographing and photo-lithographing.

Newspapers, printing and publishing of.

Magazines, printing and publishing of.

Periodicals, printing and publishing of; photoengraving; photostating; printing establishments, operation of; printing ink, manufacture of; publishing establishments, operating of; etc.

17.20—Education: All schools, colleges, universities and other educational institutions should place this allocation symbol on their orders.

CLASS 18.00—RECREATION AND AMUSEMENT.

Manufacturers of recreational and amusement equipment and operators of amusement parks, carnivals, theaters, etc., are placed in this Allocation Classification. This classification includes companies engaged in such operations as,

Ammunition for private use, manufacture of; amusement park equipment, manufacture and operation of.

Cameras, manufacture of; cards, playing, manufacture of; carnival equipment, manufacture and operation of; children's vehicles (except bicycles and baby carriages), manufacture of; circus equipment, manufacture and operation of; coin operated weighing machines, manufacture of.

Dolls, manufacture of.

Fire arms for private use, manufacture of; fireworks, manufacture of; floodlights (theater and photographic use), manufacture of.

Games, manufacture of.

Motion picture reels and containers, manufacture of; moving pictures, production of; musical instruments, parts and materials, manufacture of.

Organs, manufacture of.

Phonograph needles, manufacture of; phonograph records, manufacture of; phonographs, manufacture of; photographic apparatus and materials, manufacture of; pianos and parts, manufacture of; projectors, manufacture of.

Seats for theaters, manufacture of; sporting and athletic goods, manufacture of.

Theater equipment, manufacture of; theaters, operation of; toys, manufacture of.

Vending, amusement and other coin-operated machines manufacture of.

CLASS 19.00—EQUIPMENT AND SUPPLIES FOR OFFICE USE.

This symbol should be used by companies engaged in such operations as,

Adding machines, manufacture of; addressing machines, manufacture of.

Bookkeeping machines, manufacture of.

Calculating machines, manufacture of; calendars, manufacture of; carbon paper, manufacture of; cash registers, manufacture of; ceiling fans, manufacture of; check-writing machines, manufacture of; coin counters, manufacture of; counters and tables for store use, manufacture of.

Envelope fasteners, manufacture of; envelopes, manufacture of.

File fasteners, manufacture of; filing cabinets and cases, manufacture of.

Hand stamps, stencils and brands, manufacture of.

List finders, manufacture of.

Notebooks and ledgers, manufacture of.

Office and store machines, manufacture of; office chairs, manufacture of; office desks and tables, manufacture of; office furniture, manufacture of.

Paper clips, manufacture of; paper punches, manufacture of; partitions, shelving and cabinets for office and store use, manufacture of; pencil sharpeners, manufacture of; pencils and crayons, manufacture of; pens, mechanical pencils and points, manufacture of; pin tickets, manufacture of.

Safes and vaults, manufacture of; scotch tape holder, manufacture of; signal clips, manufacture of; stationery, manufacture of; store furniture and fixtures, manufacture of.

Tape moisteners, manufacture of; typewriters, manufacture of; typewriter ribbons, manufacture of.

Wire baskets (office use), manufacture of; wire staples, manufacture of; wire tag fasteners, manufacture of; writing ink, manufacture of; etc.

CLASS 20.00—MACHINERY AND EQUIPMENT FOR INDUSTRIAL USE.

20.10—Metal Working Machinery: This symbol should be used by companies engaged in such operations as,

Balancing machines, manufacture of; bending machines, manufacture of; broaching machines, manufacture of.

Cutting-off machines, manufacture of.

Drilling machines, manufacture of.

Filing machines, manufacture of; forging equipment, manufacture of.

Gear cutting machines, manufacture of; gear-tooth grinding machines, manufacture of.

Grinding machines, manufacture of.
Housing machines, manufacture of.

Key seaters, manufacture of.

Lapping machines, manufacture of; lathes, manufacture of.

Machine tools, manufacture of; metal working machinery, manufacture of; metal working saws, manufacture of; milling machines, manufacture of.

Planers, manufacture of; pressing machines, manufacture of; punching machines, manufacture of.

Rod and wire forming machines, manufacture of; rolling mill machinery, manufacture of.

Shaping machinery, manufacture of; spring winding and forming machines, manufacture of.

Threading machinery, manufacture of.

Wire drawing machines, manufacture of; etc.

20.20—All Other Industrial Machinery and Equipment, including Mining, Construction, Special and General Industry Machinery: This symbol should be used by companies engaged in such operations as,

Bake ovens for commercial use, manufacture of; baking machinery, manufacture of; beaming machinery (textile), manufacture of; beet-sugar machinery, manufacture of; bookbinding machinery, manufacture of; bottle-making machinery, manufacture of; bottling machinery, manufacture of; box-making machinery, manufacture of; brewhouse machinery, manufacture of; bulldozers, manufacture of; butter making and butter working machines, manufacture of.

Cane sugar machinery, manufacture of; canning machinery, manufacture of; carding (textile) machinery, manufacture of; cars and car equipment for industrial and mining use (other than automotive), manufacture of; cement mixers, manufacture of; clay working machinery, manufacture of; coffee grinding machinery, manufacture of; coffee roasting machinery, manufacture of; combing machinery (textile), manufacture of; confectionery machinery, manufacture of; construction machinery, manufacture of; cotton ginning machinery, manufacture of; cranes, manufacture of; cream separators, industrial use, manufacture of.

Derricks, manufacture of; dough mixers, industrial, manufacture of; dredging machinery, manufacture of.

Electrical measuring instruments, manufacture of; excavating machinery, manufacture of.

Finishers, tampers, vibrators (construction), manufacture of; food packaging machinery, manufacture of; food products machinery, manufacture of; fiber to fabric machinery (textile), manufacture of.

Garnetting machines (textile), manufacture of.

Hat machinery, manufacture of; heaters for construction work, manufacture of; hoists and winches (construction), manufacture of.

Ice cream machinery, manufacture of; industrial machinery, manufacture of.

Knitting machinery, manufacture of.

Last and related products for making shoes, manufacture of; leather working machinery, manufacture of; locomotives and parts for industrial and mining, manufacture of; looms (textile), manufacture of.

Measuring instruments, mechanical, manufacture of; mechanical - power - transmission equipment, manufacture of; mining machinery and equipment, manufacture of.

Oil-field machinery and tools, manufacture of.

Paint making machinery, manufacture of; paper mill, pulp mill, and paper products machinery, manufacture of; pasteurizers, manufacture of; picker machines, (textile), manufacture of; photoengraving machinery, manufacture of; printing-trades machinery, and equipment, manufacture of.

Sawmill machinery, manufacture of; scales and balances, manufacture of; scrapers, manufacture of; sewing machines, industrial, manufacture of; shoe machinery, manufacture of; sheeps' foot rollers, manufacture of; special industrial machinery, manufacture of; spinning machines, manufacture of.

Textile machinery, manufacture of; tobacco machinery, manufacture of; tractors, industrial and construction use, manufacture of.

Veneer machines, manufacture of.

Wood working machinery, manufacture of; etc., etc.

CLASS 21.00—NEW BUILDINGS, CONSTRUCTION.

21.10—Buildings for Manufacturing and Commercial Purposes, Construction of: The construction of buildings such as the following are included in this Allocation Classification:

All types of railroad buildings.

Building for electric generating plants.

Hangars, commercial and private, and other airport buildings.

Industrial plants. Mine buildings. Office buildings. Stores. Telephone control offices and repeater stations. Warehouses. Etc., etc.

21.20—All Types of Dwellings, Construction of: The construction of buildings such as the following should be placed in this classification by the prime contractor:

Apartment houses; Civilian barracks; Clubs; Homes; Hotels; etc., etc.

21.90—All Other Types of Buildings, Construction of: The following types of new buildings construction should be placed in this classification by the prime contractor:

Barns; Farm outbuildings; Fire Stations; Garages; Greenhouses; Health Centers; Hospitals; Jails and Prisons; Kennels; Motion picture houses; Police Stations; Public Buildings (except dwellings, Class 14.20), etc., etc.

CLASS 22.00 — OPERATING SUPPLIES AND BUILDING REPAIR AND MAINTENANCE.

This classification is intended primarily for manufacturers of articles and supplies usually designated as "operating supplies" such as,

Abrasive wheels, stones, paper, cloth, and related products, manufacture of.

Ball ties, manufacture of; Bits (drill), manufacture of; Blow torches, manufacture of; Bolts, nuts, washers, and rivets for retail sale, manufacture of; Brick carriers, manufacture of.

Cable splicers, manufacture of; Carpenters' tools, manufacture of; Chisels, cold, manufacture of; Cleaning and polishing preparation, blackings and dressings, manufacture of; Cordage and twine, manufacture of; Cup hooks, manufacture of.

Diamond drilling bits, manufacture of.

Electric lamps (light bulbs), manufacture of; Electric line tools, manufacture of.

Files and rasps for metal and woodworking, manufacture of; Floor scrapers, manufacture of.

Gear pullers, manufacture of; Glaziers' tools, manufacture of; Grease and oil cups, manufacture of; Grease pumps and guns, manufacture of.

Hand scrapers, manufacture of; Hose clamps, manufacture of.

Industrial leather belting and packing leather, manufacture of; Iron and steel machine and wood screws, manufacture of.

Logging, tools, manufacture of; Lubricating outfits and pumps, manufacture of.

Nails, spikes, etc., manufacture of.

Oil pumps, manufacture of.

Padlocks, manufacture of; Plumbers' furnaces for soldering irons, manufacture of; Plumbers tools, manufacture of; Putty knives, manufacture of.

Railroad track tools, manufacture of; Razor blade scrapers and holders (except razors), manufacture of; Rivet sets, manufacture of; Rules, manufacture of.

Saws, for wood, steel, etc., manufacture of; Shoeknives, manufacture of; Sledges and bars, manufacture of; Small construction tools, manufacture of; Steel engraving tools, manufacture of; Stone drills, manufacture of.

Tacks and staples, manufacture of; Tape measures, manufacture of; Tools for drop forging, manufacture of; Tire spreaders, manufacture of; Tool boxes, manufacture of; Tools, small, manufacture of.

Wall scraper, manufacture of; Wire clippers, manufacture of; Wire tighteners, manufacture of, etc., etc.

CLASS 23.00—ALL OTHER END USES.

This classification is intended for manufacturers who do not come directly within any other class or whose products, such as subassemblies, are not incorporated into some other product. This symbol will be used by companies engaged in such operations as:

Artists' materials, manufacture of; Ash trays, manufacture of.

Barometers, manufacture of; Badges and key tags, manufacture of.

Candles, manufacture of; Caskets, coffins, burial cases and other morticians' goods, manufacture of; Cigarette cases and lighters, manufacture of; Clocks, watches, and materials and parts, manufacture of; Covered wire for artificial flowers, manufacture of; Costume jewelry and costume novelties, manufacture of.

Drawing instruments, manufacture of.

Fancy boxes for jewelry, combs, toilet sets, etc.; Feathers, plumes, and artificial flowers, manufacture of.

Greeting cards, manufacture of.

Hydrometers, manufacture of; Jewelers' findings and materials, manufacture of; Jewelry cases and instrument cases, manufacture of; Jewelry (precious metals), manufacture of.

Key blanks, manufacture of.

Lapidary work (cutting and polishing of precious stones); License tags, manufacture of.

Monuments, tombstones and cut stones, manufacture of.

Novelties, manufacture of.

Paper bags, manufacture of; Pipe cases, smoking, manufacture of; Pipes, smoking, manufacture of; Pulp goods (pressed and molded novelties), manufacture of.

Signs, advertising displays and novelties, manufacture of; Statuary and art goods, manufacture of; Suitcases, brief cases and other luggage, manufacture of.

Tobacco pipes and cigarette holders, manufacture of; Trunks, manufacture of.

Watchcases, manufacture of; Wrapping paper, manufacture of; etc., etc.

BUSINESSES WHICH TRANSMIT CUSTOMER'S SYMBOL

Businesses whose operations are not included in any of the listed classifications, will transmit to their suppliers the Symbols received on their customer's orders. Companies whose operations fall into the category are of such types as,

Air compressors, manufacture of.

Barrels, kegs, and drums, manufacture of; Batteries, storage and primary, manufacture of; Bearings, and all types, manufacture of; Bolts, nuts, and washers, manufacture of.

Carbon products for electrical industry, manufacture of; Carburetors, manufacture of; Collapsible tubes, manufacture of; Conduit and fittings, manufacture of; Cooperage, barrels, kegs, tubes, and other containers made of staves, manufacture of.

Diesel engines, manufacture of; Dispensing pumps, manufacture of; Door and window sash, frames, molding and trim, manufacture of; Door closers, manufacture of; Door hinges, manufacture of; Door knockers, manufacture of; Door springs, manufacture of; Dynamos, electric, manufacture of.

Electric face plates, manufacture of; Electric motors; Electric outlets, manufacture of; Electric plugs, manufacture of; Electric sockets, manufacture of; Electric switches, manufacture of; Elevators and escalators, manufacture of; Enameled iron sanitary ware, manufacture of.

Faucets, manufacture of; Fiber cans and tubes, manufacture of; Flush tanks, manufacture of; Furnaces, manufacture of; Fuses, manufacture of.

Gaskets, manufacture of; Gears and crankshafts, manufacture of; Generators, manufacture of; Glass containers, manufacture of.

Internal combustion engines, manufacture of.

Linoleum and other hardsurface floor coverings, manufacture of; Lighting fixtures, manufacture of; Lock sets, manufacture of.

Mechanical furnace stokers, manufacture of; Motors electric, manufacture of.

Oil burners, domestic and industrial, manufacture of; Ornamental grill work, manufacture of.

Power boilers, manufacture of.

Railings, manufacture of; Rivets and washers, manufacture of.

Screw machine products and wood screws, manufacture of; Sinks, manufacture of; Steam and hot water heating apparatus, manufacture of; Steam engines and turbines, manufacture of; Steel barrels, kegs, and drums, manufacture of.

Tanks and shells for water heaters, manufacture of; Tin cans, manufacture of.

Venetian blinds, manufacture of.

Water heaters, manufacture of.

WAR PRODUCTION BOARD

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(Chemicals, Protective Coatings, Synthetic Rubber)
Chief: Ernest W. Reid; D. P. Morgan, Deputy Chief
Priority Specialists: E. A. Gysbers, F. C. Rice

COPPER BRANCH

(Address: Temporary Building "R")
Chief: H. O. King
Priority Specialists: J. H. Reed, W. R. Lair
Legal Counsel: Wm. J. Hoff

Ore Production, Refining Section
Chief: F. A. Ayer

MATERIALS DIVISION—Continued

Allocations Section

Chief: Edgar H. Hammond Jr.
Brass Mills: A. G. Dennison
Foundries, Jobbers Dealers: W. A. Meissner Jr.

Copper Products Section

Chief: John W. Douglas
Consultants: J. C. Von Daacke, W. G. Wiley
Lend-Lease: W. G. Schneider
Fabricated Copper: W. H. Maxwell, Thomas Nast, H. W. McMullen

Copper & Copper Alloy Scrap & Ingot Section

Chief: Michael Schwarz

Conservation Section

Chief: Michael Schwarz

ZINC BRANCH

(Temporary Building "R")
Chief: George C. Heikes — Asst.: W. C. Page
Priority Specialist: M. L. Trilsch
Allocation Section: Myron L. Trilsch, Chief
Fabrication Section: F. M. Carlson
Production Section: W. C. Page

MANGANESE-CHROME BRANCH (Manganese, Chromium, Silicon, Zircon, Columbium, Tantalum, Titanium, Rutile, Spiegeleisen & Ferroalloys)
Chief: Andrew Leith — Deputy Chief: D. F. Frache
Priority Specialist: Richard G. Pedrick

TIN-LEAD BRANCH (Lead, Tin, Ilmenite pigment, Antifriction Bearing Metals, solders)
Chief: Erwin Vogelsang — Deputy: S. K. Butterworth
Priority Specialists: J. A. Mirel, C. L. Wing
Commodity Specialists, Tin Allocation: R. E. Segur, W. T. Newbold
Mining Section: C. A. Wright
Conservation: E. G. Janeway, Frank Benson
Tin-Lead Scrap: I. Davis, W. L. Raup Jr.
Civilian Allocation: Wallace Barlow

MICA-GRAPHITE BRANCH (Mica, Graphite, Gypsum, Magnesite, Cryolite, Fluorspar, Cadmium, Bismuth, Indium, Gallium)
Chief: R. B. Ladoo; Asst.: E. H. Dawson
Priority Specialist: H. B. Sharpe

MISCELLANEOUS MINERALS BRANCH (Mercury, Industrial Diamonds, Quartz Crystals, Platinum group metals, Radium, Uranium, Kyanite, Abrasives, Diamond Dies, Jewel Bearings)
Chief: R. J. Lund — Deputy Chief: R. D. Parks
Bernard N. Jackson
Priority Specialist: R. R. McLachlen

BUREAU OF INDUSTRIAL CONSERVATION
(Railroad Retirement Bldg., Washington)
Chief: Lessing Rosenwald
Deputy Chief: Paul C. Cabot
Conservation and Substitution: Harvey A. Anderson
Specifications: C. L. Warwick, Chief
Simplification: Howard Cooniey, Chief
Salvage:
Industrial: C. H. McArthur
General: H. L. Gutterson
Auto Graveyard Unit: C. B. G. Murphy
R. A. Wheeler, E. F. Mulligan

DIVISION OF INDUSTRY OPERATIONS

Director: J. S. Knowlson
Plans, Program Section: Blackwell Smith
Executive Officer: Sidney Sherwood
Executive Assistant: C. K. Tranum
Head Priority Specialist: J. M. Tucker

BUREAU OF INDUSTRY ADVISORY COMM.
Chief: T. Spencer Shore
Assistant Chief: Kenneth Watson
Executive Assistant: S. H. Dykstra

BUREAU OF PRIORITIES
Chief: C. H. Matthiessen Jr.
Assistants: C. C. Crawford, Arthur Harris, J. W. Peters
Deputy Chief: J. P. Gregg (Review, enforcement)
Assistant Chiefs: C. C. Crossland (Operations); J. H. Martin (Policy); L. J. Martin (Enforcement); H. P. Nelson (Requirements); S. S. Stratton (Priority Specialist)

Review & Approval Branch
Chief: S. L. Phraner

Compliance & Inventory Branch
Chief: L. J. Martin

Housing Branch
Chief: Sullivan Jones

Production Requirements Branch
Address: Temporary Building "E"
Acting Chief: C. M. Schoenlaub
Operations: E. S. Pleasonton
Development: W. C. Groce

Maintenance & Repair Branch
Chief: D. C. Gallagher

Distributors' Branch
Chief: L. C. White

Education, Industrial Contact Branch
Chief: E. E. Pratt
Industrial Section: Mason Manghum

Foreign Requirements Branch
Chief: Fred Louis Jr.

Procedure Section
Chief: E. V. Russ

BUREAU OF FIELD OPERATIONS
Chief: L. Edward Scriven

BUREAU OF INDUSTRY BRANCHES

Chief: Philip D. Reed
Deputy Chief: Amory Houghton
Assistant Bureau Chiefs: John R. Kimberly, Ben Alexander
Facilities Staff Chief: W. B. Murphy
Special Assistants: W. B. Murphy, N. G. Symonds, A. F. Shafter, W. C. Baker, Jacques Coleman
Executive Assistant: Marshall J. Dodge Jr.
Head Priority Specialist: W. G. W. Glos

Automotive

Chief: Ernest Kanzler (Boulevard Bldg., Detroit)
Deputy Chief: R. L. Vaniman
Administrative Assistant: J. B. Kessler
Engineering: F. A. Bower
Labor: Fred Harbison
Machinery: E. C. Brandt
Material: D. J. Hutchins

Rubber & Rubber Products

Chief: Dr. H. S. Rogers
Deputy Chiefs: E. E. Ferrebee, A. R. Freedlander

Textiles, Clothing, Leather
Chief: Henry Rose

Food Supply
Chief: D. C. Townson

Consumers Durable Goods
Chief: J. A. Hurley
Priority Specialist: J. J. Moore Jr.

Pulp & Paper

Chief: David J. Winton
Priority Specialist: J. L. Ritchie

Printing & Publishing

Chief: George A. Renard
Priority Specialist: F. E. Merrill

DIVISION OF INDUSTRY OPERATIONS—Continued

Services
Chief: Nathaniel G. Burleigh
Assistant Chief: O. G. Sawyer

Special Industrial Machinery
Chief: L. G. Greenleaf; Assistant, Ivan Anderson

Construction Machinery
Chief: J. F. Ryan
Used Machinery: H. O. Penn

Air Conditioning, Refrigeration
Chief: J. M. Fernald

Transportation
Chief: Andrew Stevenson
Assistant Chief: S. L. Miller

Communications
Chief: Leighton H. Peebles
Telephone Section: B. H. McCurdy

Farm Machinery, Equipment
Chief: W. R. Tracy

General Industrial Equipment
Chief: C. S. Williams

Health Supplies
Chief: Francis M. Shields
Deputy Chief: Fred J. Stock

Safety & Technical Equipment
Chief: Dr. E. Raymond Schaeffer

Plumbing & Heating
Chief: W. W. Timmis
Appliance Section: H. M. Brundage
Priority Specialist: P. B. Hoppin

Lumber & Lumber Products
Chief: A. T. Upson
Priority Specialist: C. Henri Rush

Building Materials
Chief: John L. Haynes

Containers
Chief: Douglas Kirk
Priority Specialist: J. W. Rankin

Furniture & Bedding
Chief: William A. Adams

PURCHASES DIVISION

Director: Houlder Hudgins (acting)
Deputy Director: L. C. Lustenberger
Policy Committee: Douglas MacKeachie (War Dept.), F. M. Folsom (Navy), A. J. Browning (Army), James MacPherson (Treasury), Houlder Hudgins
Asst. Directors: O. W. Dexter, W. L. James
Executive Officer: S. A. Burke
Consultant: S. F. Telle
Plant Site Board: Houlder Hudgins, Acting Dir.
Statistics: O. P. Knauth
Legal Staff: A. B. Hawes
Information: John T. Moutoux
Procurement Advisory Specialists: George R. Farrel, steel; F. T. Ketchum, plumbing and heating; M. C. Gregory, building supplies

Contract Review Branch
Chief: Robert J. de Camp
Analyst: T. H. Sanders

Accounting & Distribution Advisory Branch
Chief: M. C. McIntosh; Consultants: Eric Camman, M. Peloubet

LABOR DIVISION

Director: Wendell Lund
Associate Directors: J. O. Keenan, P. J. Clowes
Advisors: D. K. Niles, Herbert Harris, E. F. Prichard Jr.
Board of Review: L. K. Comstock, Chairman
Administrative Officer: George Brooks
Management Consultant: John W. Nickerson
Industrial Relations: W. Ellison Chalmers
Shipbuilding Stabilization Committee: Paul Porter
Industry Branch Consultant: Richard Lester

CIVILIAN SUPPLY DIVISION

Director: Leon Henderson
Deputy Director: Joseph L. Weiner
Executive Officer: Harold W. Osterhout
Civilian Supply Comm.: Harold Stein, Secy.
Supply & Requirements: J. W. Angell
Planning: A. R. Burns
Industrial Programs: D. L. Crawford
Consumer Programs: R. S. Vaile
Services Programs: Reavis Cox
Information: R. G. Van Tine

PRODUCTION DIVISION

H. E. Talbott, G. C. Brainard, Deputy Directors
H. G. Wilde, R. J. Holland, Assistants
W. C. Armstrong, Head Priority Specialist
Information: Alfred D. Charles

Ordnance Branch
E. F. Johnson, Chief
F. B. Bell, Asst., H. T. Bodman, D. E. Gamble
Heavy Ordnance: E. S. Chapman
Light Ordnance: B. D. McIntyre
Explosives: L. deB. McGrady
Directors: John Demarest
Optics: E. R. Sheaffer
Production Scheduling: Ralph M. Jordan
Priority Specialist: Walter C. Armstrong

Aircraft Branch
M. C. Meigs, Chief
T. P. Wright, Asst. Chief
Engineering Section: Thomas Carroll
Production Planning Section: A. O. Pierrot
Manufacturing Section: H. R. Boyer
Scheduling unit (Dayton, O.): A. E. Lombard Jr.
Standardization sub-Committee: T. P. Wright, Chr.; Maj. D. G Lingle, recorder
Allocation Sub-Committee: A. E. Lombard, Chr.
Priorities Section: R. E. Lees, Chief

Radio Branch
Ray C. Ellis, Chief

Tools Branch
George C. Brainard, Chief
H. W. Dunbar, Asst. Chief
A. B. Einig, Adm. Chief
Machine tools: A. M. Stedfast
Used Machine tools: R. B. Rhoads
Cranes: J. D. Glatz
Industrial supplies: Frantz T. Stone
Foundry Equipment: W. R. Bean
Heat-treating Equipment: Bradley Stoughton
Woodworking Machinery: A. M. Stedfast
Priority Specialist: C. D. Bending

Contract Distribution Branch
C. E. Hallenborg, Chief
B. T. Bonnot, Asst. Chief
Field Service: L. F. Young
Pooling: T. A. Dicus

Shipbuilding Branch
Capt. J. O. Gawne, Acting Chief
C. M. Lynge, Joseph Dunn, J. S. Gamble
David Hayes
Priority Specialist: W. C. Wetherill

Construction Bureau
(Empire State Bldg., New York)
W. V. Kahler, Chief
T. L. Peyton, Asst. (Washington)

Technical Services Branch
George A. Landry, Chief

STATISTICS DIVISION

Director: Stacy May
Assistant Director: Oswald Knauth
Administrative Assistant: Gordon Arneson
Administrative Officer: R. W. Turnley
Industry Branch: Virgil D. Reed
Munitions Branch: M. A. Copeland
Contracts Branch: Emerson Ross
Materials Branch: J. F. Dewhurst
Questionnaire, Statistical Services: Howard Grieves

OFFICE OF PRICE ADMINISTRATION

Temporary Building "D," Fourth St. and Independence Ave., S. W., Washington, D. C. Telephone Republic 7500

Administrator: Leon Henderson

Senior Deputy Administrator: John E. Hamm

General Counsel: C. D. Ginsburg
Secretary: Charles A. Bishop
Deputy Administrators:
Dr. J. K. Galbraith
Dexter M. Keezer
Paul M. O'Leary

PRICE DIVISIONS

Deputy in Charge: Dr. J. Kenneth Galbraith
Executive Assistant: L. C. Vass
Import Control: Read Hager
Export Control: S. E. Harris

FOOD AND APPAREL DIVISION
Director: H. R. Tolley

Fertilizer, Insecticide Branch
Executive: George Cushman

Food, Food Products Branch
Executive: A. C. Hoffman

Textile, Leather, Apparel Branch
Executive: B. E. Oppenheim

FUEL DIVISION
Director: G. W. Stocking
Petroleum Branch
Executive: G. W. Doffing

Solid Fuels Branch
Executive: G. B. Gould
Bituminous Mines: J. H. Reppert
Economic Research: W H. Voskuil

GENERAL PRODUCTS DIVISION

Automobile Branch
Executive: Cyrus McCormick
Assoc. Exec.: R. F. Jerome

Building Materials Branch
Executive Herbert Wachsmann

Consumer Durable Goods Branch
Executive: Alfred Auerbach
Associate: H. C. Mansfield

Paper and Products Branch
Executive: R. M. Macy

Rubber Branch
Executive: B. W. Lewis
Mechanical Goods: L. O. Foster

INDUSTRIAL MATERIALS DIVISION
Director: S. H. Wallace

Chemicals and Drug Branch
Executive: R. Gorman Phelps
Associates: L. J. LaBrie, R. J. Bullock, O. B. Helfrich
Coating Materials: G. D. Goldberg

Copper, Aluminum Ferroalloys Branch
Executive: C. G. Holmquist
Associate: G. R. Taylor

Aluminum, Magnesium, Mercury Section
Head: E. Stanley Glines
Mercury and Beryllium: J. O. Coff
Primary Aluminum: W. W. Schultz
Primary Magnesium: C. H. Burgess
Scrap, Secondary Metal: A. R. Barwick

Brass Mill Products Section
Head: O. S. McCorison
Ammunition Brass: Frank Katz
Standard Products: Myron Rosenfield

Copper and Nickel Section
Head: C. W. Nichols
Consultant: F. C. Tillberg
Nickel: T. A. Ritchie
Primary Copper: L. R. Kegan
Scrap, Secondary Copper: Gardner Ackley

Ferroalloy Section
Head: D. H. Van Deusen
Chromium: J. L. Ray
Cobalt: W. F. Sterling
Ferrosilicon: W. F. McKinnon
Manganese: J. L. Hugg
Vanadium: E. W. Sniffen

Foundries Section
Head: T. F. McManus
Foundry Unit: J. B. Meier

Iron and Steel Branch
Executive: Clair Wilcox
Associate: Roswell Whitman
Administrative Head: John Coppock
Field Operations: William Whitehead
Basic Materials: D. A. Tutein
Castings: D. D. Kennedy
Fabricated Products: H. M. Teaf
Research: W. M. Blaisdell
Scrap: E. A. France Jr., C. D. Scully, E. J. Allen
Mill Products: G. Griffith Johnson
Warehouses: E. L. Wyman
Bolts, Nuts, Rivets: T. I. Dunn
Used Drums and Parts: Samuel Ewing

Lumber Branch
Executive: P. A. Stone

Machinery Branch
Executive: W. A. Neiswanger
Construction Equipment: Walter Shoemaker
Power Equipment: M. W. Lee
Farm Equipment: E. J. Working
General Machinery: T. J. Kinsella
Liaison and Research: J. E. Gorham
Machine Tools: J. J. Rodgers
Machine Parts: William Neiswanger
Processing Machinery: W. H. Reilly
Transportation Equipment: C. F. Munroe

Zinc, Lead, Tin Branch
Executive: J. D. Sumner
Admin. Officer: N. H. McDiarmid
Lead and Antimony: D. C. Lockhart
Metal Products: K. L. Anderson
Minor Metals: J. D. Sumner
Research and Analysis: M. M. Bober
Secondary Metals and Scrap: Kermit Gordon
Zinc, Tin, Cadmium: O. C. Lockhart

RATIONING DIVISIONS

Deputy in Charge: P. M. O'Leary
Executive Officer: L. J. Kroeger

AUTOMOTIVE DIVISION
Rationing Executive: Rolf Nugent
Admin. Services: V. H. Olson

Fuel Branch
Executive: Joel Dean
Admin. Services: R. W. Brewster
Operations: J. G. Neukom

Tire Branch
Executive: C. F. Phillips
Admin. Officer: C. A. Kellner

FOOD DIVISION
Director: H. B. Rowe

GENERAL SERVICES

Deputy in Charge: D. M. Keezer
Information: L. S. Plummer
Transportation: J. H. Eisenhart
Accounting: H. S. Taggart
Administration: G. C. S. Benson

CONSUMER DIVISION
Director: R. E. Sessions
Products Development: Morris Sanders
Field Service: Sargent Child

RESEARCH DIVISION
Director: K. V. Gilbert

OPA REGIONAL OFFICES

Atlanta, Candler Bldg.
Regional Director: O. R. Strauss Jr.
Executive Officer: J. A. Short
Price Executive: R. P. Brooks

Baltimore, Baltimore Trust Bldg.
Regional Director: L. S. McCormick
Price Executive: L. G. Reynolds

Boston, 17 Court Street
Regional Director: K. B. Backman
Executive Officer: Carl Rogers
Price Executive: Frank Beane

Chicago, 20 North Wacker Drive
Regional Director: J. C. Weigel
Price Executive: E. P. Hohman
Executive Officer: T. K. Tindale

Cleveland, Union Commerce Building
Regional Director: B. L. Williams
Executive Officer: Russell Cook
Price Executive: C. L. James

Dallas, Fidelity Union Bldg.
Regional Director: M. McCullough
Executive Officer: W. H. Brooks
Price Executive: Emmet Redford

Denver, National Bank Building
Regional Director: Clem W. Collins
Executive Officer: A. H. Rosenthal
Price Executive: A. D. H. Kaplan

Kansas City, 405 E. Thirteenth street
Regional Director: B. L. Hargis
Executive Officer: L. S. Reid
Price Executive: Jonathan Richards

Minneapolis, Midland Bank Bldg.

New York, 350 Fifth Ave.
Regional Director: Sylvan Joseph
Executive Officer: J. R. Johnston
Price Executive: James F. Bogardus

Philadelphia, Broad St. Station Bldg.

San Francisco, 1355 Market Street
Regional Director: H. F. Camp
Executive Officer: F. E. Marsh
Price Executive: Norman Buchanan

WPB FIELD OFFICES

Field offices of Division of Industry Operations, War Production Board, are listed below. These offices place no orders but provide information and engineering assistance to producers relative to available war contracts. Manufacturers seeking war work should take or send to the nearest field office full information regarding their equipment and the products they normally manufacture. Regional offices established in 13 cities administer activities of the various branch offices.

REGIONAL OFFICES

ATLANTA, with jurisdiction over Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Florida. Regional Director, Frank H. Neely.

BOSTON, with jurisdiction over Massachusetts, Connecticut, Rhode Island, Vermont, New Hampshire, Maine. Regional Director, Walter H. Wheeler Jr.

CHICAGO, with jurisdiction over Illinois, Indiana, Iowa, southern Wisconsin. Regional Director, Joseph L. Overlock.

CLEVELAND, with jurisdiction over Ohio (except Toledo area), Kentucky, West Virginia, western tip of Maryland, western Pennsylvania (including Pittsburgh, Johnstown and Erie). Regional Director, John C. Virden, Union Commerce building, Cleveland, Telephone: Cherry 7900.

DALLAS, with jurisdiction over Texas, Louisiana, Oklahoma. Regional Director, R. E. Rissey.

DETROIT, with jurisdiction over Lower Peninsula of Michigan and Toledo area in Ohio. Regional Director, Ernest Kanzler, 800 Boulevard building, Detroit, Telephone: Trinity 1-5500.

DENVER, with jurisdiction over Colorado, New Mexico, Utah, Wyoming. Regional Director, Leslie A. Miller.

KANSAS CITY, with jurisdiction over Missouri, Arkansas, Kansas, Nebraska. Regional Director, Wade T. Childress.

MINNEAPOLIS, with jurisdiction over Minnesota, North Dakota, South Dakota, northern Wisconsin, Upper Peninsula of Michigan. Regional director to be appointed.

NEW YORK, with jurisdiction over New York and portion of New Jersey north of Trenton. Regional Director, Joseph P. Maguire.

PHILADELPHIA, with jurisdiction over Pennsylvania (except portion in Cleveland region), Delaware, Virginia, New Jersey (south of and including Trenton), Maryland (except western tip). Regional Director, Orville H. Bullitt, Broad St. Station building. Philadelphia, Telephone: Walnut 5900.

SAN FRANCISCO, with jurisdiction over California, Arizona, Nevada. Regional Director, Harvey H. Fair.

SEATTLE, with jurisdiction over Washington, Oregon, Idaho, Montana. Regional director to be appointed.

BRANCH OFFICES

Alabama
Birmingham, Phoenix Bldg.

Arizona
Phoenix, Security Bldg.

Arkansas
Fort Smith, 13 North Seventh St.
Little Rock, Rector Bldg.

California
Fresno, Mattei Bldg.
Los Angeles, 1031 South Broadway
Oakland, Financial Center Bldg.
Sacramento, Farmer's & Mechanic's Bldg.
San Diego, Union Bldg.
San Francisco, 1355 Market St.

Colorado
Denver, U. S. National Bank Bldg.
Pueblo, Star Journal Bldg.

Connecticut
Hartford, Phoenix Bank Bldg.
Bridgeport, 144 Golden Hill St.
New Haven, Liberty Bldg.

Delaware
Wilmington, Penn Bldg.

Florida
Jacksonville, Lynch Bldg.
Miami, Congress Bldg.
Tampa, Wallace South Bldg.

Georgia
Atlanta, Candler Bldg.

Idaho
Boise, Capital Securities Bldg.

Illinois
Chicago, 20 North Wacker Drive.
Decatur, Standard Office Bldg.
Peoria, Alliance Bldg.
Springfield, Leland Office Bldg.

Indiana
Indianapolis, Circle Tower Bldg.
Evansville, Koenig Bldg.
Ft. Wayne, Utility Bldg.
South Bend, 206 City National Bank Bldg.

Iowa
Des Moines, Crocker Bldg.

Kansas
Wichita, Union National Bank Bldg.

Kentucky
Louisville, Todd Bldg.

Louisiana
New Orleans, Canal Bldg.
Shreveport, Giddens Lane Bldg.

Maine
Bangor, 44 Central St.
Portland, Congress Bldg.

Maryland
Baltimore, 1254 Baltimore Trust Bldg.

Massachusetts
Boston, 17 Court street
Fall River, 7 South Main St.
Lowell, 8 Merrimac St.
Springfield, 95 State St.
Worcester, State Mutual Bldg.

Michigan
Detroit, Boulevard Bldg.
Grand Rapids, Michigan Nat'l Bank Bldg.
Iron Mountain, Commercial National Bank Bldg.

Minnesota
Minneapolis, Midland Bldg.
Duluth, 416 Federal Bldg.

Mississippi
Jackson, Tower Bldg.

Missouri
St. Louis, Paul Brown Bldg.
Kansas City, Mutual Bldg.

Montana
Helena, 222 Power Block Annex

Nebraska
Omaha, Grain Exchange Bldg.

Nevada
Reno, Saviers Bldg.

New Hampshire
Manchester, Amoskeag Industries Bldg.

New Jersey
Camden, 300 Broadway
Newark, Globe Bldg.
Trenton, City Center Bldg.

New Mexico
Albuquerque, 103½ West Central Ave.

New York
New York, Chanin Bldg.
Albany, Standard Bldg.
Brooklyn, 16 Court St.
Buffalo, Manufacturers' & Traders' Bank Bldg.
Rochester, 119 East Main St.
Syracuse, Starrett-Syracuse Bldg.
Utica, First National Bank Bldg.

North Carolina
Charlotte, New Liberty Life Bldg.
Raleigh, Sir Walter Hotel Bldg.

North Dakota
Bismarck, First National Bank Bldg.

Ohio
Canton, Commercial Bldg.
Cleveland, Union Commerce Bldg.
Cincinnati, Union Trust Bldg.
Columbus, Spahr Bldg.
Dayton, Third National Bank Bldg.
Toledo, Security Bank Bldg.
Youngstown, Union National Bank Bldg.

Oklahoma
Oklahoma City, Key Bldg.
Tulsa, Kennedy Bldg.

Oregon
Portland, Bedell Bldg.

Pennsylvania
Philadelphia, Broad St. Station Bldg.
Allentown, 506 Hamilton St.
Chester, 12-14 East Fifth St.
Erie, Erie Trust Company Bldg.
Harrisburg, Blackstone Bldg.
Johnstown, U. S. National Bank Bldg.
Lancaster, Woolworth Bldg.
Norristown, Norristown-Penn Trust Bldg.
Pittsburgh, Fulton Bldg.
Reading, 615 Penn St.
Scranton, First National Bank Bldg.
Wilkes-Barre, 53 West Market St.
Williamsport, Susquehanna Trust Co. Bldg.
York, Manufacturer's Association Bldg.

Rhode Island
Providence, Industrial Trust Bldg.

South Carolina
Columbia, Manson Bldg.

South Dakota
Sioux Falls, Boyce Greely Bldg.

Tennessee
Memphis, Sterick Bldg.
Chattanooga, James Bldg.
Knoxville, Goode Bldg.
Nashville, Stahlman Bldg.

Texas
Dallas, Fidelity Bldg.
El Paso, El Paso National Bldg.
Houston, Electric Bldg.
San Antonio, Majestic Bldg.

Utah
Salt Lake City, 306 David Keith Bldg.

Vermont
Montpelier, 12 State St.

Virginia
Richmond, 10 South Fifth St.

Washington
Seattle, White-Henry-Stuart Bldg.
Spokane, Old National Bank Bldg.

West Virginia
Charleston, Capital City Bldg.
Clarksburg, Empire National Bank Bldg.
Huntington, West Virginia Bldg.
Wheeling, 1025 Main St.

Wisconsin
Appleton, 341 West College Ave.
Eau Claire, 128½ Graham Ave.
Madison, Washington Bldg.
Milwaukee, Plankinton Bldg.
Wausau, 404 Third St.

Wyoming
Casper, Box 1211

PRIORITIES FIELD SERVICE

The following district managers, who report to the Division of Industry Operations, War Production Board, serve in an advisory capacity in priorities. Chief function is to advise holders of war and essential civilian contracts on matters relating to priority ratings on materials.

Atlanta, Ga.—John B. Reeves, Candler Bldg.
Baltimore—Theodore M. Chandlee, Baltimore Trust Bldg.
Birmingham—M. J. Lide, Phoenix Bldg.
Boston—W. P. Homans, 17 Court St.
Buffalo—Paul R. Smith, Rand Bldg.
Charlotte, N. C.—J. E. MacDougall, Liberty Life Bldg.
Chicago—E. H. Eitel, 20 North Wacker Dr.
Cincinnati—Elmer C. Henlein, 34 East Fourth St.
Cleveland—G. A. Moore, Union Commerce Bldg.
Dallas, Tex.—John B. Joyce, Fidelity Bldg.
Dayton, O.—Harold B. Doty, Third National Bank Bldg.
Denver—Virgil Board, U. S. National Bank Bldg.
Detroit—James E. Wilson, Boulevard Bldg.
El Paso, Tex.—R. C. Stryker, El Paso National Bank Bldg.
Hartford, Conn.—Edwin L. Howard, 119 Ann St.
Helena, Mont.—Oscar A. Baarson, Power Block House.
Houston, Tex.—George L. Noble, Jr., Electric Bldg.
Indianapolis, Ind.—Albert O. Evans, Circle Tower Bldg.
Jacksonville, Fla.—George H. Andrews, Lynch Bldg.
Kansas City, Mo.—C. B. Shaeffer, Mutual-Interstate Bldg.
Knoxville, Tenn.—D. K. Porteous, Goode Bldg.
Little Rock, Ark.—C. S. Christian, Rector Office Bldg.
Los Angeles—A. R. Thomas, Western Pacific Bldg.
Louisville, Ky.—James T. Howington, Todd Bldg.
Memphis, Tenn.—J. K. Lester, Sterick Bldg.
Milwaukee—Frank J. Tharinger, Plankinton Bldg.
Minneapolis—Willard F. Kiesner, Midland Bank Bldg.
Nashville, Tenn.—George S. Gillen, 1015 Stahlman Bldg.
New Orleans—Louis H. Clay, Canal Bldg.
New York—Sydney Hogerton, 122 E. Forty-Second St.
Oklahoma City, Okla.—C. F. Aurand, 414 Key Bldg.
Omaha—V. H. Black, Grain Exchange Bldg.
Philadelphia—George McGovern, 1617 Pennsylvania Blvd.
Phoenix, Ariz.—L. G. Browne, Security Bldg.
Pittsburgh—Charles C. Cruciger, Fulton Bldg.
Portland, Oreg.—J. Fred Bergesch, Bedell Bldg.
Richmond, Va.—10 South Fifth St.
Salt Lake City, Utah—Ralph E. Bristol, Utah Oil Bldg.
San Antonio, Tex.—Carl L. Pool, 415 W. French Place
San Francisco—James A. Folger, 1355 Market St.
Seattle, Wash.—William D. Shannon, White-Henry-Stuart Bldg.
St. Louis—L. E. Crandall, 314 North Broadway
Tampa, Fla.—H. E. Brennan, Wallace South Bldg.
Tulsa, Okla.—A. E. Ballin, Kennedy Bldg.